Gas Journal

DECEMBER 15, 1937

Vol. 220 89th Year No. 3891

Editorial Notes

Air-Raid Precautions

A BILL which according to its title is to " secure that precautions shall be taken with a view to protection of persons and property from injury or damage in the event of hostile attack from the air " has been introduced by the Government and is now well on its way to the Statute Book. It is a deplorable blot on our civilization that such a Bill should be necessary, but few would disagree that it is high time to look facts—ugly though they be—in the face; to be forewarned is to be forearmed. The Bill confines its attentions to local authorities and places upon them the duty to prepare and submit air-raid precaution schemes. Such schemes must be submitted to the Secretary of the State for Air, whose duty it will, no doubt, become to secure a certain degree of uniformity throughout the country. A percentage of the expenditure incurred by any local authority under the Bill is to be defrayed by the Treasury, the amount of the Government Grant being based upon the population of the area.

Among the various powers conferred upon local authorities is the right to purchase land compulsorily, and it is satisfactory to note that the land of public utilities, both in England and Scotland, is exempt from this right. It is to be remembered, however, that local authorities are not the only bodies upon whom the duty of making air-raid precautions will fall. Companies which provide gas, electricity, and water are also under a heavy responsibility to the public and will have to make due preparations for the maintenance of their essential services and the safety of their employees. It would be unreasonable if a local authority gas department was able to obtain financial assistance from the Government, while a company which under statutory authority rendered similar service to the public was forced to rely solely upon its own resources. As Mr. R. C. Morrison said in the House of Commons, public bodies are getting disgruntled because of the fact that they are expected to spend a great deal of time in drafting schemes and appointing air-raid officers, without receiving any indication whether their position is to be as favourable as that of local authorities.

In the debate on the Committee stage no direct answer was given to this pertinent question. Sir Samuel Hoare stated, however, that the question was complicated, but that he was anxious to make a clear statement so that public utilities shall know exactly where they stand. In our view the claim of the companies appears to be nothing short of a demand for common justice. We recall that some years ago an appeal was made to gas companies to put into execution work likely to create employment. Gas companies responded nobly to the call and no one thought it unreasonable that they should receive financial assistance from the Government. Once again gas companies are being asked to provide large sums of money for work which is essential to the community as a whole. Surely some portion at least of this expenditure should fall upon the taxpayers rather than be placed solely upon gas consumers—a class which embraces the poorest section of the population.

Hire-Purchase

THE right to introduce Private Bills is a privilege highly valued by Members of Parliament, and Mr. A. P. Herbert has proved that by this method it is possible to carry through reforms with which the Government might hesitate upon its own initiative to deal. Following this example, Miss Ellen Wilkinson has introduced a Private Bill dealing with the subject of hire purchase and has obtained a substantial amount of support from all Parties. The Bill obtained a Second Reading in the House of Commons on Friday last and received the qualified support of the Government. It will, no doubt, be carefully sifted and analyzed on Committee Stage. The Bill applies both to hire purchase agreements and also to agreements for sale under which the purchase price is to be paid by instalments, provided that the goods which are the subject matter of the agreement do not exceed £100 (or £50 if there is only one article) in value and that five or more instalments are payable.

The main features of the Bill are that, after paying one-third of the price, the hirer may return the goods and thereby terminate the agreement, and that upon any breach of the agreement the owner may not resume possession of the goods until he has served seven days' notice upon the hirer. Any hirer is entitled to appeal to

the County Court for relief upon receiving such a notice, and the kind of relief which may be given is left very much to the discretion of the County Court Judge. The Bill also provides that every agreement must state the hire purchase price or the total price payable as well as the price for which the goods can be purchased for cash. The custom of purchasing goods upon hire purchase terms has increased enormously since the War and is now firmly established in almost all spheres of industry. It enables the public to purchase necessaries—and even luxuries—out of income, and, generally speaking, it has been found satisfactory and beneficial to industry. That cases may arise in which there may be some element of hardship is hardly open to doubt, and the housewife who is induced to sign any paper that some itinerant vendor places before her may well require some protection from her own stupidity or ignorance.

It can hardly be imagined, however, that public utility undertakers are to be included among the class of trader against which the Bill is aimed, since such undertakers are already regulated by Parliament and can only sell or loan appliances if expressly authorized so to do by Act or Order. The Legislature has even thought fit to place appliances owned by gas undertakers in a position of special privilege in exempting them from liability to be seized in distress or bankruptcy proceedings. Further, public utilities do not sell or loan appliances and then disappear from the district; on the contrary, they are in constant touch with their consumers and realize that the satisfied hirer of a gas appliance is more likely to be a good consumer of gas than one who feels that unreasonable conditions have been imposed upon him. There is no doubt that during Committee Stage the views of public utility undertakers will be strongly urged and that every endeavour will be made to exempt them entirely from the operation of the Bill.

Coke for the Open Grate

A Technical Paper has been issued by the Department of Scientific and Industrial Research on the use of coke in open domestic grates, in which the results are set out of a study carried out at the Fuel Research Station of the factors influencing the combustion of low and high temperature cokes in the open grate. The influence was investigated of such factors as the size of the coke, the percentage of ash and moisture present, and the design of the grate, and the conclusions drawn as a result of the work will be of interest to all concerned with the preparation and sale of solid smokeless fuels. The economics of the question of substituting smokeless fuels for raw coal are not, of course, touched upon, but the Gas Industry has grounds for satisfaction in this respect from the findings of the Report. It may perhaps be suggested, however, that the time has arrived for an impartial investigation of the actual performances of smokeless solid fuels now being marketed, to serve as a comparative guide to their efficiencies in use.

Having drawn attention to the quality of raw coal at present consumed for domestic purposes—estimated at 25-30 million tons—the Paper points out that the coke produced at gas-works by the normal methods of coal carbonization at high-temperatures is readily and widely available, and "it is a very satisfactory fuel provided that it is suitably graded and used in special grates fitted with a gas burner for ignition purposes." The availability of gas-works coke is an all-important consideration —and, moreover, it is available at a cost which compares favourably with coal, at a price within the means of all types of consumer. The work at the Fuel Research Station brings out once again the need for the careful grading of coke if it is to give full satisfaction in the open firegrate—a matter which we have emphasized time and again in these columns. Careful grading of cokes becomes considerably more important as the combustibility diminishes. Tests showed that in the vertical bar grate the best size of the high-temperature coke tested was 1-1¼ in. This coke was a moderately combustible high-temperature vertical retort coke containing 1% of volatile matter. In regard to the moisture content, this was found to affect seriously the ignition and initial combustion of cokes and to reduce the level of radiation roughly in proportion to the moisture content of free-burning cokes. With the high-temperature coke the effect was even more marked, and large amounts of moisture led to considerable difficulty in igniting the charge. We would call particular attention to the fact that no evidence was found for the statement made from time to time that a small percentage of moisture assists combustion. In this connection we may recall the publication by the South Metropolitan Gas Company in 1934 of "The Solid Products of Carbonization of Coal." In that publication, which detailed an investigation extending over several years, the statement appeared: "This work finally disposes of the superstition that the presence of moisture assists the ignition of coke."

Volatile Matter and Structure

The relative importance of volatile matter and coke structure in determining the combustibility of coke has long been a matter of debate. That both volatile matter and coke structure affect the ignition and combustion of cokes is amply demonstrated by the experiments described in the Report. The first series on the direct effect of volatile matter was made on two samples of coke produced in an experimental vertical retort. A quantity of low-temperature coke was produced at 600° C. and a portion was reheated to 900° C. to reduce the volatile matter content from 8·5% in the 600° C. to 2·7% in the reheated coke. It was considered that the structure of the coke would not be altered. The difference in combustibility was marked, and it was concluded that, in the case of low-temperature coke, the amount of volatile matter has a direct effect on combustibility, an increase improving the initial combustion and increasing the maximum rate of radiation. A large number of tests made on cokes prepared by the carbonization of blends of coal, or of coal and coke breeze, at high and low temperature, showed, however, that the structure of the coke substance may be as important as volatile matter in determining burning characteristics. Ease of ignition and initial combustion were invariably improved as the coke substance became more loosely bound together. In practice, of course, one has to consider the abradability of cokes of loose structure. The fact was once again brought out that partly burnt cokes are more combustible than the original coke in spite of a much lower volatile content, and the reason for this was ultimately traced to the differences in the number of open pores in the cokes. Partial combustion had rendered the coke substance porous by breaking down and burning away parts of the walls of the coke cells. The finding that, from the point of view of ignition and initial combustion,

volatile matter may be reduced to a comparatively low figure, provided the coke structure is suitably modified, is, of course, of immediate concern to the Gas Industry.

In regard to ash, the results of experiments " indicated that the quality of the ash may be almost as important as the actual quantity expressed by weight; a light and floury ash, besides being more noticeable in the fire on account of its light colour, quickly obstructed the passage of air through the fuel bed and was often found difficult to remove." This compares with the following conclusion from the South Metropolitan Gas Company's publication to which we have referred: " In the open fire the volume of the ash is of more consequence than its weight." This question of volume of ash is, of course, a most important one. Floury or flocculent ash often causes excessive dust trouble on account of the ease with which it spreads about the room when it is disturbed in the grate. It has prejudiced many a housewife against the use of smokeless fuel which in other respects she has found satisfactory. A most interesting section of the Fuel Research Paper is that dealing with the experiments on the effect of quantity of ash on the combustion of a low-temperature coke. Cokes were prepared by the carbonization at low temperatures of mixtures of clean coals and the dirt obtained from one of the coals in varying proportions to give ash contents ranging from 6·6 to 22·2%. The presence of excessive ash in the coke did not affect the ease of ignition; the initial combustion of the coke containing 22·2% of ash was actually a little more rapid than that containing only 6·6% of ash. The maximum rate of radiation, however, was reduced roughly in proportion to the ash-free coke substance, and the radiation therefore decreased at a greater rate for the high ash content cokes. " With cokes of lower combustibility than the low-temperature fuels, the presence of ash may become more noticeable. Thus, although an increase in ash content may be tolerated in a readily combustible fuel, a corresponding increase of ash in coke of a type which is difficult to ignite and is rather slow burning may render this fuel unsuitable."

In an introduction to the Paper it is stated that cokes produced by the various carbonization processes may possess widely different physical and chemical characteristics, and some may be unsatisfactory in comparison with even inferior coals when used in certain grates or under unsuitable conditions. " The experiments described in this report were accordingly undertaken to trace and isolate the effect of these variations in properties and to assess the suitability of different types and modifications of open grates for different cokes," and we learn that " tests on a series of cokes prepared at temperatures ranging form 400° to 900° C. showed that the temperature of carbonization had a marked effect on the combustibility. Cokes produced at 700° C. and below were easy to ignite and burned freely, while those produced at the higher temperatures were difficult to ignite and slow in combustion." Three years ago the South Metropolitan Company reported: " A smokeless solid fuel, readily ignitable and freely burning in the ordinary domestic grate, can be obtained by the carbonization of coal at temperatures below 700° C. If coal be carbonized above this temperature the solid product is inferior as a domestic fuel."

Our point is that the objects of the investigations of the Fuel Research Board and the South Metropolitan Gas Company were similar; and it is surprising that in the work covered by the new Technical Paper, which to such a large extent covers the same ground and arrives at similar conclusions, no use, it would seem, was made of the results reported in the 1934 publication of the South Metropolitan Gas Company. Also, in view of the vast amount of high temperature coke being sold for domestic purposes as compared with the small available quantity of low-temperature semi-cokes which are relatively expensive, we may suggest that perhaps a more profitable line of investigation would have been to study the performances in different types of domestic appliance of the cokes already marketed on a large scale. Such a study might well lead to improvements in all-round efficiency in use of these fuels and thereby to an immediate and substantial reduction of the smoke nuisance.

Forthcoming Engagements

Dec.

16.—S.B.G.I.—Council Meeting, 2.30 p.m.
16.—I.G.E.—Refractory Materials Joint Committee 2.30 p.m.
20.—London and Counties Coke Association.—Finance Committee, 10.45 a.m.; Executive Committee, 11.15 a.m.; Central Committee, 2.30 p.m., Gas Industry House.

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Jan.

1.—London and Southern Juniors.—Visit to the Headquarters of the London Fire Brigade.
7.—I.G.E.—Joint Committee on Complete Gasification under Pressure, 3 p.m., at 16, Old Queen Street, S.W. 1.
8.—Scottish Eastern Juniors.—Visit to Milne's Meters, Ltd., Edinburgh.
13.—Midland Juniors.—Meeting and Paper by A. T. Green.
15.—Scottish Western Juniors.—Debate meeting.
15.—Yorkshire Juniors.—Meeting at Leeds. Paper by W. S. Hubbard, " Choice of Gas Storage."
18.—London and Southern Juniors.—Meeting and Paper by R. T. d'Eyncourt, " Load Value of Appliances as a Guide to Sales Policy."
22.—Western Juniors.—Meeting at Weston-super-Mare. Paper by A. G. Holtham, " Rural Gas Services."
27.—Midland Juniors.—Visit to Docker Bros., Paint and Varnish Manufacturers, Birmingham.
29.—Scottish Western Juniors.—Visit to Glasgow Corporation Lighting Department.

Feb.

2.—London and Southern Juniors.—Visit to Watson House.
3.—Midland Juniors.—Meeting and Paper by G. Bakewell, of Birmingham, " The Sale of Coke for Domestic Purposes."
5.—Scottish Eastern Juniors.—Short Paper Meeting at Dunfermline.
5.—Manchester and District Juniors.—Meeting at Blackpool. Paper by T. V. Blake, " A Six Years' Period Prior to the Removal of Blackpool Gas-Works."
12.—Scottish Western Juniors.—Meeting and Paper by E. Smith, of Dumbarton, " Stores Control and Job Costing."
15.—London and Southern Juniors.—Meeting and Paper by E. W. B. Dunning, of the Gas Light and Coke Company, " The Relation of Design to Cooking Quality."
19.—Scottish Western Juniors.—Annual Whist Drive and Dance.
24.—Joint Junior Visit to the British Industries Fair, Castle Bromwich.
26.—Yorkshire Juniors.—Meeting at Barnsley. Paper by Dr. L. Friedman, of Ascot Gas Water Heaters, Ltd.
26.—Western Juniors.—Visit to Bristol. Paper by A. B. Horsfield.
26.—Scottish Juniors.—Joint Meeting at Edinburgh. Paper by Col. W. Carmichael Peebles on " Governors."

March 1 to 3.—B.G.F.—Joint Gas Conference at British Industries Fair, Birmingham.

Personal

W. J. Sandeman.

Mr. W. J. Sandeman, J.P., General Manager of the Croydon Gas Company, has been elected Chairman of the Executive Committee of the British Commercial Gas Association for the year 1938. Mr. Sandeman has been a member of the Executive Committee since its inception. He was elected Honorary Treasurer of the Association in 1927 and Executive Vice-Chairman in 1929. He succeeds Mr. A. W. Smith, General Manager of the Birmingham Gas Department, who has been Chairman for the past year since the retirement of Sir Francis Goodenough.

* * *

P. F. Holmes.

Messrs. W. C. Holmes & Co., Ltd., of Huddersfield, are celebrating the 60th anniversary of the connection of their Governing Director and Chairman, Mr. P. F. Holmes, with the firm founded by his father, William Cartwright Holmes, nearly a century ago. Mr. Holmes has received many gifts signifying the high regard and affection in which he is held by his employees and personal and business friends, including a desk and reading lamp, a gold cigarette box, and a portfolio of patents dating from 1855.

In company with fourteen old employees of the firm, of forty years' service and over, Mr. Holmes has been the recipient of a certificate expressing appreciation of long and faithful service.

At a Dinner held on Friday last, which was followed by an entertainment provided by members of the staff, congratulatory telegrams were received from personal friends in the Industry and branches and agents of the firm overseas.

All works employees will receive full pay for the Christmas Holiday in commemoration of this anniversary.

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Mr. J. Castle, B.Sc., until recently on the technical staff of Messrs. W. C. Holmes & Co., Ltd., has been appointed Assistant Engineer and Manager to the Borough of Brighouse Gas Department.

Obituary

Samuel Cutler.

The death of Mr. Samuel Cutler, which we were able only briefly to record in our last issue, will be deeply regretted throughout the Gas Industry, in all sections of which he had numerous friends.

Born in 1869 and educated at Clifton College and the Technical University at Mittweida, Germany, he became a partner in Saml. Cutler & Sons at the age of 26 and succeeded to the Chairmanship on the death of his father in 1923.

His activities were many, and being gifted with much capability and concentration he conducted the business of his own firm with great success, and was a valued colleague on the boards of many other industrial concerns, including the Barnet Gas and Water Company, Messrs. C. & W. Walker, Ltd., the Ferro-Concrete Construction Company, Ltd., and Dry Gasholders, Ltd. Up to the time of their amalgamation, he was also a Director of the Harrow Gas Company and Chairman of Hemel Hempstead Gas Company.

In the early days of vertical retorts he was a very active member of the Vertical Gas Retort Syndicate which sponsored the Dessau system, and had considerable interests in ice making and refrigeration in connection with which he was for a period a Director of the Romford Ice and Cold Storage Company, Ltd.

As a pioneer member he took great interest in the Junior Institution of Engineers, and occupied the Chair in 1903 to 1905. He was Chairman of the Council of the Society of British Gas Industries in 1919-20, an Associate Member of the Institution of Civil Engineers, a member of the Institution of Mechanical Engineers, The Institution of Gas Engineers, the Society of Engineers, the Eastern Counties Gas Managers Association, and the Associazione Italiana Gas E Acqua.

He travelled widely in connection with the many foreign contracts carried out by Messrs. Saml. Cutler & Sons, and on these occasions his considerable linguistic abilities were a great asset.

Although for the past three years he has suffered the disability of defective eyesight due to cataract and undergone several operations in connection with this misfortune, he maintained his business activities to within a fortnight of his death, which occurred on Dec. 7 very suddenly from heart failure.

* * *

The death has occurred at the age of 69 of Mr. Thomas Thompson, of The Hollies, Shirebrook, near Mansfield. He was a Director of the Shirebrook and District Gas Company.

* * *

We regret to announce the death on Nov. 30 at the age of 60 of Mr. Harold Hutchinson, who was Engineer and Manager of the Barnsley Gas Company for twenty-two years. This position at Barnsley has been held by three generations of the family. Mr. Hutchinson retired when the Barnsley Company was taken over by the Sheffield Gas Company early this year.

South London Exhibition

Novel Scheme for Crystal Palace

The South London Exhibition, cancelled last year when half organized owing to the great fire which destroyed the Crystal Palace on the evening of Nov. 30, will be on the map again from March 16-26 next. Once again the Crystal Palace will be the scene of this popular event, at which a prominent feature for many years past has been the comprehensive gas exhibit of the South Metropolitan and South Suburban Gas Companies, supported by a number of leading manufacturers.

Plans now issued show that the new exhibition will straddle the existing permanent roads of the Lower Terrace with its lakes, fountains, and permanent bandstand immediately below the old Crystal Palace. Smart, lofty, and spacious single-span pavilions will be erected to house the exhibits. The pavilions will be constructed of canvas on a rigid semi-permanent framework of steel-braced timbers. They are of a type which is in extensive use on the Continent and has proved satisfactory under all conditions for the accommodation of exhibitions of international character.

Five pavilions will be erected, interconnected by covered ways and disposed roughly in the form of the letter H. The largest hall—the cross stroke of the H—will be 420 ft. long by 100 ft. wide. Two side halls will be each 370 ft. long by 76 ft. wide, and two 144 ft. by 100 ft. Some idea of the full effective height may be gained from the fact that in one hall a well-known firm of builders will erect two full-size houses of the popular types which they have built in many London suburbs.

The new-style buildings will make available more actual floor space than was ever occupied by any of the six previous South London Exhibitions in the Crystal Palace itself. Access to this magnificent site (which has been placed at the disposal of Ewart Watson Exhibitions, Ltd., the organizers, by the Trustees of the Crystal Palace) will, it is anticipated, be by way of a new road constructed to run from a point near the Old South Entrance on Crystal Palace Parade.

The pavilions, all of which are being constructed in London by Standcraft, Ltd., have called for what is believed to be the largest single order for sail-canvas ever placed in this country. Practically the entire annual output of a leading Lowestoft firm will be used to cover the exhibition. A specimen pavilion of medium size is in course of erection on the site for inspection by exhibitors.

Extensive space in the forthcoming exhibition has already been booked by local and national firms and official bodies.

News in Brief

CURRENT EVENTS IN THE GAS INDUSTRY

A Reduction in the price of gas by 9d. per 1,000 cu.ft., making it 3s. 9d. per 1,000 cu.ft., as from Jan. 1, has been decided upon by the Dunbar Town Council.

For New Showrooms, Bury Gas Committee proposes to utilize a site at the junction of Market Street and the Haymarket, in accordance with the plans submitted by the Borough Engineer.

An Offer to Light the streets of Linlithgow by the Gas Company has been accepted by Linlithgow Town Council. The term of the agreement is three years, at a cost of £175 per annum.

Once Again the "New World" Cooker has secured for its gratified owners first, second, and third prizes in a cake-baking competition arranged recently in Bromsgrove. The entries were judged and prizes awarded by a leading confectioner of the town.

Christmas Cooking Demonstrations were held in the showrooms, Drake Street, Rochdale, under the auspices of the Corporation Gas Department from Dec. 1 to 4, inclusive. Demonstrations were given twice daily except Saturday, and there were good attendances.

Application is being made by Loughborough Town Council to borrow £8,000 to cover the cost of a high-pressure main and gas compression plant in connection with the acquisition of Quorn and Mountsorrel Gas Undertaking, which amalgamation was announced in our issue of Jan. 6.

A Robinson Bindley Plant for the production of liquid hydrocarbons from coke oven gas is being erected at Messrs. William Baird & Co., Ltd.'s, Bedlay Colliery, Glenboig, Lanarkshire. It is understood that this plant is for the purpose of trying out the process on a semi-commercial scale.

Cookery Lectures arranged by the Nelson Corporation Gas Department and held in the Congregational School were well attended and proved highly successful. The series commenced on Nov. 29 and demonstrations each afternoon and evening concluded on Dec. 3. Miss Hamer, of Radiation Research Kitchen, was in charge of the lectures, and special features of the menus prepared were dishes for Christmas fare.

The Second Lecture of the Season arranged for the Sales and Distribution Departments of the Sheffield Gas Company took place at the chief showrooms, High Street, on Dec. 3. On this occasion Mr. H. Barnes, Technical Representative of Messrs. Bratt Colbran, Ltd., gave a talk on gas heating appliances, including high-temperature panel heating. The talk proved most instructive and interesting as it included a full description of the construction and working of these appliances. The lecture was illustrated by means of lantern slides.

In a Debate on the respective merits and services of gas and electricity before the St. Austell Chamber of Commerce the case for the Gas Industry was stated by Mr. J. C. Cotterill, Engineer, Manager, and Secretary of the St. Austell and District Gas Company. At the conclusion of Mr. Cotterill's opening remarks, the Chairman of the Chamber, Mr. C. Hodgson, commented that it was one of the most interesting talks on gas to which he had ever listened. He was particularly interested in the reference to the charging of wireless batteries by gas.

A Gas Fire Campaign is now in full swing at Newcastle-upon-Tyne. An attractive sales letter has been mailed to 10,000 consumers as part of this campaign and 40,000 folders printed in colour, setting forth in a practical manner the advantages to be gained from adopting the Company's domestic tariff, has been distributed. Latest self-lighting fires are being fitted on hire for as little as 2d. per week. "This year," the folder runs, "an increasing number of our customers have converted their heating, cooking, and water requirements to 'all-gas,' entirely eliminating solid fuel from their homes. May we add your home to this number?" A keynote of the campaign is the hospitality aspect of the inviting warmth of the gas fire.

A Suggestion by Renfrew Town Council that Glasgow Corporation supply gas for industrial and domestic purposes at the Hillington Industrial Estate, Renfrewshire, has been approved by the Gas Committee of the Corporation. It is proposed that this arrangement continue for a period of at least ten years, and the agreement contemplated will allow of an option to Renfrew to take over the service later if desired on payment mutually satisfactory for the pipes and other works which are installed.

Great Success Attended the recent cookery demonstrations organized by the Secretary of the Berwick and Tweedmouth Gas Company in co-operation with Radiation Ltd. The proceedings were opened by the Chairman of the Company, Mr. Peters, in the presence of 1,100 visitors. A cake-baking competition arranged and judged by the demonstrator, Mrs. .Hardy, of the Radiation Research Kitchen, attracted a number of competitors and the successful candidates were presented with prizes by Mrs. Peters.

Not Even Bad Weather could deter the public of Spalding from showing their appreciation of the cookery demonstrations held last week at the new showrooms, Station Street. A cake and bread-baking competition arranged by the Spalding Gas Department resulted in a large number of entries of a very high standard. The prizes were distributed by Councillor Barker, Chairman of the Gas Committee. Demonstrations were given with a new "Talbot" cooker by Miss E. Eccles, of Cannon Research Kitchen.

Continental Cookery Demonstrations were given at Reading from Dec. 6 to 11 by Miss Hilde Zimmermann, of the Radiation Research Kitchen. Miss Zimmermann was introduced by Mr. D. H. Helps, Engineer and Manager of the Reading Gas Company, in the absence through indisposition of the Chairman, Mr. R. W. Edwards. Mr. Helps drew attention to her long experience on the Continent of giving gas cookery demonstrations; in selecting items she had been careful to ascertain that they were suitable for English taste. The invitation card, which included the programme, bore on the outer cover the words "Radiation Passport—Mrs. Housewife." Inside was a map of Europe showing the countries from which the menus originated.

A Sectional Meeting of the World Power Conference will be held in Vienna next year, by invitation of the Austrian National Committee. The exact dates, it is now stated, will be Aug. 25 to Sept. 2, 1938. The Sectional Meeting will be followed by one or more "study tours," of approximately a week's duration. The British Government has, it is understood, received an invitation from the Austrian Government to be represented by Official Delegates at the Vienna Sectional Meeting. The Executive of the British National Committee are meeting in a few days' time in order to give preliminary consideration to the promotion of British participation in the Vienna Sectional Meeting, and to appoint the Committees which will be responsible for arranging for the preparation of the British Papers for presentation at this Conference.

The Twenty-Eighth Annual Exhibition of scientific instruments and apparatus, arranged by the Physical Society, will be held at the Imperial College of Science and Technology, Imperial Institute Road, South Kensington, S.W. 7, as follows: Tuesday, Jan. 4, from 2.30 p.m. to 9 p.m.; Wednesday, Jan. 5, from 4 p.m. to 9 p.m.; and Thursday, Jan. 6, from 2.30 p.m. to 9 p.m. The leading manufacturers of scientific instruments will be exhibiting their latest products in the trade section. The research and educational section will contain contributions from research laboratories, and experiments of educational interest. Admission to the exhibition is by ticket only. Members of Institutions and Scientific Societies may obtain tickets from their Secretaries; tickets may also be obtained direct from the Exhibition Secretary, 1, Lowther Gardens, Exhibition Road, S.W. 7.

Correspondence

Intermittent Chambers at Weston

SIR,—I have read with much interest in your issue of Dec. 1 the description of the new carbonizing plant at Weston-super-Mare constructed by our esteemed competitors, the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd.

That article, as well as your Editorial of Dec. 8, seems to imply (doubtless unintentionally) that the intermittent vertical chamber plant at Weston-super-Mare is not merely the first from which the recuperator has been eliminated, but is simultaneously the first supplied with a separate battery of step-grate gas producers, the latter being an indirect consequence of the former. I should therefore appreciate the courtesy of your columns to make the following observations:

Of the numerous C.O.L. intermittent vertical chamber plants constructed in this country and the Dominions, two have reduced recuperators and separate step-grate gas producers, and the third (nearly completed) is without recuperators and has also separate gas producers.

The first of these (2 millions capacity) has worked at the Flathouse Works, Portsmouth, for six years, and was reset last year (see "JOURNAL" of July 15, 1931).

The second (1 million capacity), at Stalybridge, has been operating over three years (see "JOURNAL" of Oct. 16, 1935).

The third is at Petone, near Wellington, New Zealand, where the recuperators are eliminated, separate step-grate gas producers being provided.

Perhaps I might observe, by the way, that the first proposal of this combination of which I am aware is to be found in an official publication of 1931 in the name of my Company.

I think it will be clear from the above that the provision of separate producers is not dependent upon the elimination of recuperators as suggested in the article. Moreover, our C.O.L. continuous vertical retorts are also built without recuperators and have separate producers.

Yours, &c.,

For Gas Chambers and Coke Ovens, Ltd.

ARTHUR H. LYMN,
Chairman and Managing Director.

Artillery House,
Westminster, S.W. 1,
Dec. 14, 1937.

[We have pleasure in publishing the above letter, but fail to see how our editorial comment or the descriptive article would lead to the impression that the Weston plant is the first to be supplied with a separate battery of step-grate producers. We were, of course, fully aware of the type of construction employed in the C.O.L. installations at Portsmouth and Stalybridge. In an editorial comment on the Portsmouth plant in the "JOURNAL" for July 15, 1931, we called attention to the fact that producer gas is generated externally in an independent battery. The point which we stressed in connection with the Weston installation is in the following quotation from the comment on p. 795 of last week's "JOURNAL": "To the best of our knowledge these are the first large capacity chambers to be designed for non-recuperative heating."—ED. "G. J."]

Annual Convention of Canadian Gas Association

The thirty-first Annual Convention of the Canadian Gas Association will be held in the City of Toronto, Thursday and Friday, June 9 and 10, 1938. The headquarters of the Combine will be at the Royal York Hotel.

Amalgamation and Grouping

Stellite, Ltd., Llandudno—

Llandudno ratepayers have decided by a large majority in favour of a plebiscite being taken before the proposal to sell the Council's Gas Undertaking is finally agreed upon.

Councillor R. J. Gresley-Jones said the Stellite Company had offered to pay £107,000 in cash, *plus* certain concessions, which those in favour of accepting the offer stated were equivalent to a balance of £44,673. The ordinary gas consumers were certainly to get an immediate reduction in the price of gas of 4½d. per 1,000 cu.ft. for the first year—after that it would depend upon circumstances which might or might not work out according to plan. This reduction to ordinary consumers worked out at about £2,100 to £2,200 per year. But those in favour of these concessions forgot to point out that the ordinary gas consumers would have to pay to the shareholders of the new Company something like £6,000 a year by way of dividend, whereas if the Council retained its gas-works no dividend at all would be payable to shareholders, and there was every prospect of the gas to ordinary consumers being reduced a good deal more than 4½d. per 1,000 cu.ft. within the next ten years.

—and Conway.

Mr. J. M. Rigby, Director of the Conway Gas Company, speaking at a luncheon to mark the handing over of the Conway Gas Undertaking to Stellite, Ltd., said the Gas Industry was now following the example of other enterprises and forming itself into large units. The Managing Director of Stellite, Mr. Moore, visualized and formulated a scheme for the establishment of a gas "grid" and the amalgamation of gas undertakings along the whole of the North Wales coast. Such a scheme would lend itself to successful operation for the benefit not only of the undertakings concerned, but of the large body of consumers. In his opinion it made no difference whether an amalgamation was municipally or company owned, because it was bound to make for cheaper supplies to the consumer, provided it was properly managed.

Another speaker declared that so far Conway is one of four Councils who have taken the broad view and sold their undertaking. It would be only a question of time before there would be brought into being a gas grid starting from Chester and going right into the northern extremity of North Wales. This must, and would, give consumers gas at a very low figure and assist them to effect economies which were so necessary in these times. Bringing gas from Queensferry to North Wales, however, would be a long job.

United Kingdom, Radcliffe, and Farnworth.

Details of the Parliamentary Bill for the sale of the Radcliffe and Little Lever Gas-Works were placed before Whitefield and Prestwich District Councils last week. Messrs. R. Clayton, Castle, & Co., solicitors to the Radcliffe Gas Board, wrote to state that the Bill provides for two agreements between the United Kingdom Gas Corporation and the Joint Board and between the Corporation and the Farnworth and Kearsley Gas Company, which is one of its subsidiaries. The area of the newly constituted Company would be that of the amalgamated Radcliffe and Farnworth districts, and the name of the latter company would be changed to the Radcliffe, Farnworth, and District Gas Company. Local directors may be appointed by the district councils and town councils concerned. The completion of the sale has been fixed for Sept. 29, 1938.

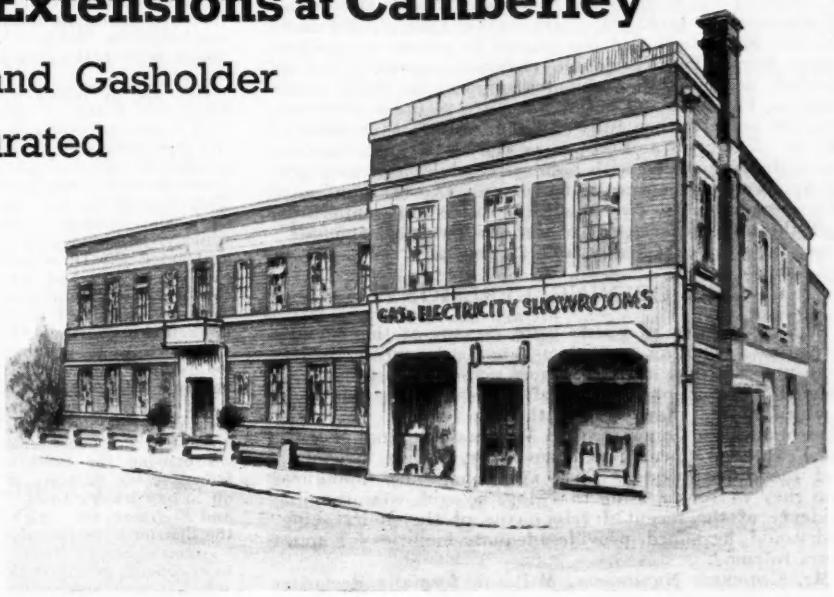
Returning the Favour

It will be recalled by many of our readers that following the accidental demolition of one of the Dewsbury gasholders that the town received supplementary supplies of gas from the neighbouring undertakings of Mirfield, Batley, and Ossett. A proposal was put forward at a meeting of the Ossett Council on July 13, 1936, to the effect that the question of linking up the mains of the Undertakings at Wakefield, Mirfield, Batley, and Dewsbury should be discussed in case of any further breakdown, subject to the approval of the municipal bodies concerned.

Dewsbury has now returned the favour by supplying gas to the Ossett area by means of inter-connected mains during the trouble the latter Undertaking experienced with its supply of coke oven gas, to which reference was made in last week's issue.

Gas-Works Extensions at Camberley

New Offices and Gasholder Inaugurated



These Offices and Showrooms, together with a new gasholder, were officially inaugurated at the Camberley Gas-Works on Dec. 8 by Mr. Godfrey Nicholson (M.P. for the Farnham Division of Surrey) for the Yorktown (Camberley) and District Gas and Electricity Company in the presence of a distinguished gathering of guests.

The Yorktown (Camberley) and District Gas and Electricity Company was formed in 1858 under the original title of the York Town and Blackwater Gas and Coke Company, Ltd., and was incorporated in February of the following year. Tenders were called for, and the construction of the gas-works was entrusted to a Mr. J. B. Porter, of Adelphi, Strand, at a sum of £1,453 15s. After a period of steady progress the Limited Company was dissolved in 1904 and re-incorporated with full statutory powers under the name of the Yorktown and Blackwater Gas Company. Five years later the parishes of Sandhurst, Crowthorne, Finchampstead, and Wokingham Without were added to the existing area of supply. In 1924 the Twyford (Berks.) Consumers' Gas Company was acquired; in 1929 the Wokingham Corporation Gas Undertaking; in 1930 the Henley-on-Thames Gas Company, while last year the combined undertaking became a subsidiary of Associated Gas and Water Undertakings, Ltd. It will be appreciated, therefore, that the Yorktown (Camberley) Company has an extensive area of supply, comparatively narrow, but stretching in a north to north-westerly direction right across Berkshire to within about ten miles of Oxford.

The following figures indicate the progress of the Company since its early days:

Year.	Output, Cu.Ft.
1890	5,000,000
1900	17,000,000
1910	73,000 000
1920	129,000,000
1930	264,000,000
1936	310,000,000

The new showrooms and offices, which form the frontage of the gas-works, were designed by Mr. A. H. Dungay, of Camberley, and constructed by Messrs. Sewell and Richardson, of Wimbledon, S.W. 19. As will be seen from the accompanying illustration, the building is thoroughly modern in conception, the combined gas and electrical showroom being a bright, airy, and colourful room, in which a wide variety of representative appliances are displayed to excellent effect. The interior of the offices is particularly pleasing to the eye, considerable use being made of oak panelling, while here again all the rooms are bright and cheerful.

Gas Central Heating.

The whole building is efficiently central heated by a gas installation by Messrs. Thomas Potterton (Heating Engineers), Ltd. The plant comprises a 360,000 B.Th.U. capacity No. 2 Series 5-section "Rex" gas-fired boiler in enamelled finish, the heating chamber being at normal ground level. This is coupled to a gravity circulation on the overhead "drop" principle, serving radiators in the various offices.

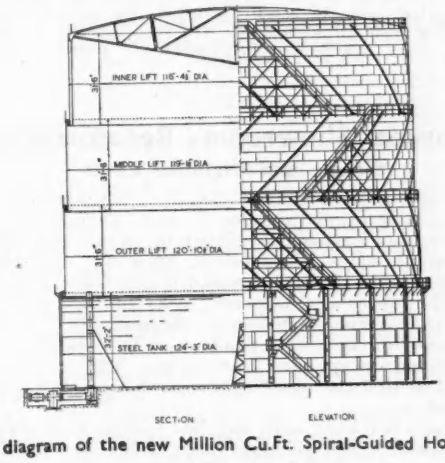
The heating for the Board Room, the Engineer's Office, and the Secretary's Office is provided by means of 24 in. "Rayrads" fitted in enclosures containing 216 sq.ft. heating surface. These provide both radiant and convected heat and are very neat in appearance, the only visible sign being the flat front surface and a grille at the top and bottom. The remaining radiators are of "Neo-Classic" column type containing a net heating surface of 754 sq.ft., and, with the "Rayrads" and short connections, are equivalent to 1,000 sq.ft. radiation, irrespective of the extensive run of mains, some of which of necessity are carried externally and waterproofed. This course was adopted in order to avoid the running of large mains within the offices.

The system is controlled by an air-temperature control fitted in a key-position, there being one thermostat for the normal day setting and another for the night and week-end setting. A clock closes the day setting thermostat and shuts off the gas until it is opened again by the lower temperature unit. The clock is fitted with Sunday selective device and a half-day advancing, so that it shuts off at noon on Saturday and does not bring the gas on to the high temperature at all on Sunday.

The boiler is fitted with water temperature thermostat to prevent the circulating temperature becoming excessive should the air-controls be interfered with. The boiler is also fitted with an automatic cut-off to shut off the gas in case of flame failure and also to form a safety lighting device ensuring that a pilot is burning in the boiler before the main gas can be brought on.

The New Holder.

The new gasholder is of the spiral-guided type of one million cu.ft. capacity. It was constructed by Messrs. Samuel Cutler & Sons, Ltd., of Westminster, upon foundations by the F. C. Construction Company, Ltd., of Derby and London.



A diagram of the new Million Cu.Ft. Spiral-Guided Holder.

There are three lifts, which descend into a tank 124 ft. in diameter by 32 ft. deep, containing nearly 11,000 tons of water. The tank plates are double butt jointed as to the five lower tiers and lap jointed in respect of the two upper tiers. Twenty double channel stanchions extend the full depth of the tank to support the spiral guide rollers. The inlet and outlet pipes are 24 in. in diameter, and the holder, when fully inflated, throws a pressure of 12½ in. The grips and crown, as well as the tank balcony, are suitably guarded with handrails, while staircases give ready access to the various balconies. The tank and cups are provided with two sets of anti-freezing apparatus, and the guide carriages are Cutler's patent "Steel-all" type, adjustable radically and tangentially.

THE OPENING CEREMONY.

A large number of guests were present at the opening ceremony, including many gas engineers and managers from undertakings in the southern counties, together with Councillors and prominent local residents. The party assembled in the main hall of the new offices, where the Chairman of the Company (Mr. W. Lees Stenning, M.B.E., J.P.) extended a hearty welcome to Mr. Godfrey Nicholson and the other guests. The extensions whose inauguration they were witnessing that day, he said, were tangible evidence of the recent developments of the undertaking, and would, he hoped, provide adequate facilities for many years to come.

Mr. GODFREY NICHOLSON, M.P., in formally declaring the new offices open, referred to the Gas Company as Camberley's major industry. It was a very important industry, and he was glad to see that in this undertaking gas and electricity were marching hand in hand, because he believed that there was no essential antagonism between the two services. The type of rivalry which existed between the two industries in various parts of the country was deplorable. They both required the same raw material —coal—which provided employment for thousands of British miners, who were among the most deserving members of the community. He trusted that these extensions would assist the Company to render satisfactory service to its consumers.

The party then proceeded to the new gasholder, where Mr. Nicholson opened the valve which admitted gas to the district.

Those present were subsequently entertained at lunch at the Agincourt Hall—Mr. LEES STENNING presiding. During lunch a programme of music was provided by the String Orchestra of the Royal Military College, under the direction of Mr. T. Stenning, A.R.C.M., by kind permission of the Commandant, Lieut.-General B. D. Fisher, C.B., C.M.G., D.S.O.

The Loyal Toast having been honoured,

Mr. GODFREY NICHOLSON proposed "The Prosperity of Camberley and District," in the course of which he observed that the Gas Industry provided a very useful index to the prosperity of the country as a whole. They were bound to experience fluctuations in prosperity, but he assured the company that there was no cause for apprehension in regard to the increased unemployment figures for November nor in regard to the international situation generally. There was no likelihood, he said, of war in Europe. The local community were to be congratulated upon the service which its gas undertaking provided. His wish for Camberley was that this place—which a hundred years ago hardly existed—should prosper and that they should be proud to be its citizens. It was with peculiar pleasure that he coupled with this toast the name of Mrs. Worsley, Chairman of the local Urban District Council, and in conclusion he thanked the Company for the opportunity of taking part in the charming ceremony they had witnessed that day.

Mrs. D. M. WORSLEY, J.P. (Chairman of the Frimley and Camberley U.D.C.), responding to the toast, said that it had been remarked that gas was the district's major industry, and she was quite sure that prosperity in any town could only be assured by co-operation with the traders and industries of that town—and that was a thing they desired to do in Camberley. They desired to co-operate in every way with the trade of the town and to listen with a sympathetic ear to the problems which were brought by them to the Council's notice. She congratulated the Directors of the Camberley Company upon the extensions they had made and wished them, on behalf of the town, every success and prosperity, and assured them that their activities met with the most sympathetic approval of the municipal authorities. On behalf of all the citizens of Camberley assembled there on that occasion, she thanked the Company for its hospitality and Mr. Nicholson for the kind way in which he proposed the health of their town.

Mr. LEES STENNING then presented inscribed silver salvers to Mr. Nicholson and Mrs. Worsley as souvenirs of the occasion, and both returned thanks for the presentations.

Proposing the toast of "The Visitors," the CHAIRMAN referred to the presence of many distinguished guests, and went on to pay tribute to Mr. H. J. RANDALL, the Managing Director and Engineer, who, with his staff, was responsible for supplying the district with two very important services.

Admiral Sir F. TUDOR, K.C.B., K.C.M.G., C.B., responding to the toast, thanked the Company for its hospitality on that occasion, and was supported by Mr. HAUTVILLE COPE as representing the Wokingham Rural District Council.

Mr. H. J. RANDALL proposed the toast of "The Contractors," and at the outset referred with deep regret to the death the previous day of Mr. Samuel Cutler, who was to have responded to this toast. Those present stood in silence for a moment in respect to his memory. Continuing, Mr. Randall spoke in eulogistic terms of the manner in which the contractors had carried out their work and completed it on time in spite of a number of difficulties. He also referred to the valuable assistance he received from his co-Directors.

Mr. W. T. PALMER (Chief Engineer of Samuel Cutler & Sons, Ltd.) and Mr. H. A. Barton, A.R.I.B.A., representing the building contractors, responded to the toast, and both paid tribute to Mr. Randall and said what a pleasure it was to have carried out this work for him.

The final toast was that of "The Yorktown (Camberley) and District Gas and Electricity Company," which was in the hands of Mr. H. C. SMITH (President of The Institution of Gas Engineers), who suggested that when the time came for the new holder to be inspected in accordance with the provisions of the new Factory Act it might be appropriate to ask Mr. Nicholson to come and "cut the first disc." Referring to Mr. Randall, Mr. Smith said he had been connected with his own Company at Tottenham, having previously served there under Mr. Broadberry, whom they were very pleased to see there on that occasion. It had been a very great pleasure to be at Camberley that day and he wished the Company every success.

Mr. W. H. BENNETT, in responding to the toast, referred to the pleasure it gave the Board to know that the efforts of the Company were appreciated. They felt they were more than justified in asking their old friend Mr. Randall to join the Board when Associated Gas and Water Undertakings, Ltd., took over the undertaking, because they had secured thereby a continuance of the able management which had been in existance for so many years. Mr. Bennett also paid tribute to the staff who assisted in carrying on the operations of the Company. Their efforts were greatly appreciated.

Many of the guests thereafter returned to the gas-works to inspect the new offices and holder and other plant.

Swansea Showrooms Reconstructed

Simple and Dignified Lines

Handsome new showrooms for the Swansea Gas Light Company were opened on Dec. 7 at 6, Temple Street.

The premises have been designed on simple and dignified lines with a black glass fascia, pilasters, and returns, while the window itself is surrounded by a frame of polished teak. The doors are polished teak, bronze, and glass. Attractive external lighting is obtained by the use of bronze gas brackets and pendants. The fascia lettering is in cream, green, and vermilion. The windows are "open" so that the whole of the interior can be seen from the street.

The walls are lined with polished walnut flush panelling with black ebonized skirting, dado, and frieze rails. The ceiling is lined with "Insulite," left in its natural colour, which gives a matt finish, while the cornices are painted in attractive colours. Recessed alcoves, fitted for the accommodation of fires and water-heaters, display the latest types of self-lighting fires, which are tastefully finished in carefully selected colours and can be obtained to match any colour scheme.

The counter for payment of accounts and the main staircase are so arranged that customers pass the entire length of the showroom to reach them. The elliptical staircase, lined with walnut, affords access to the first floor showroom. Here the decoration is more simple and forms a background for the display of gas appliances.

About 80 people can find accommodation in the large annexe which leads off the first floor showroom, which is used as a lecture and demonstration hall. Storerooms and workshops take up the remainder of the space in basement, second, and third floors. All lighting is switch controlled. Any products of combustion are carried away in ventilating trunks.

The premises have been reconstructed under the supervision and to the design of Mr. J. Herbert Jones, F.R.I.B.A., of Swansea, acting under the instructions of Mr. W. H. Johns, M.I.Mech.E., Engineer and Manager of Swansea Gas Light Company. The building contractors were Messrs. Bennett Bros. (Contractors), Ltd., Swansea.

Better Meals for the Money

Gas Light and Coke Company's Diet Sheets

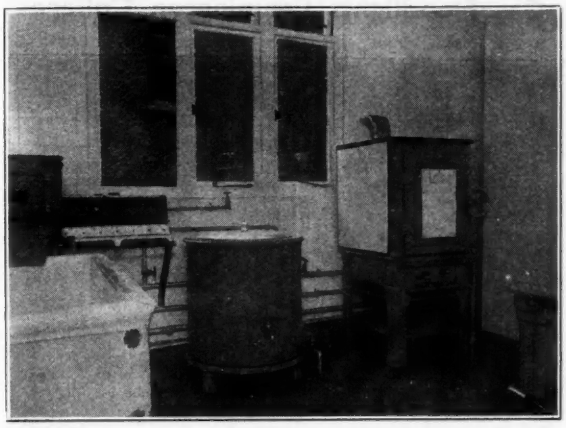
A Diet Sheet has been prepared by the Gas Light and Coke Company for distribution to consumers in connection with diet lectures in showrooms, held in conjunction with Cookery Demonstrations.

It is the practice of the demonstrator, after having cooked a meal, to explain its food value to the audience and also to give instruction on food buying and meal planning. It has proved in practice that these diet charts have aroused considerable interest, particularly in view of the publicity which has been given in recent months to the question of nutrition.

The Gas Light and Coke Company are preparing a new series applying to the period January to March next, consisting of three groups, 4s. 6d. to 6s., 7s. to 9s., and 10s. to 12s., and the gas costs will, of course, be based upon their own price of 8·7d. per therm.

Copies of these diet sheets may be obtained upon application to the British Commercial Gas Association.

Herefordshire School Cooks by Gas



In order to cope with the demands made on its kitchens by healthy young appetites, Downs School, Colwall, in Herefordshire, have provided an installation of the latest cooking equipment. Messrs. Arden Hill, of Birmingham (Radiation Ltd.), recently supplied this school with a battery of three "Guest House" cookers in mottled porcelain enamel finish, complete with gas match. These are augmented by a carving table and hot closet, a vegetable and pudding steamer, and a "Rotunda" boiler with three-tier vegetable baskets.

B.C.G.A. Staff Explorations

Watson House and Kensal House Visited

A party of B.C.G.A. "indoor" staff was invited to Watson House. To those who spend their days dealing with gas in the abstract, and who hitherto have merely viewed the local gas showrooms, this visit was most welcome and enlightening.

Most of the afternoon was spent in the Exhibition Room where numerous appliances are shown, together with cross-sections, diagrams of inner workings, and so on. The women in the party were greatly taken with the working model of the interior of a gas meter, showing the sheep-skin bellows and the clocking up of the dials. Another exhibit which proved popular was the working of the thermostat, and any doubts which the domesticated members of the party may have had as to complete reliance being placed in the automatic control were quickly dispelled. The exhibit of gas fires with the front casings removed to show the different devices employed to produce automatic ignition was also of great interest.

The party was then taken through some of the laboratories, and among a host of fascinating testing devices saw the "Radial Arm" for heat measurement, and also the "Eupatheoscope" for measuring human comfort.

In the training section at Watson House apprentices were busily employed welding joints and making wooden tool boxes, all of which would have passed the closest scrutiny. In another part fitters were taking their final course in testing the various gas appliances used in the home before passing out to assemble and repair for the public.

Another department of obvious interest was for the testing of industrial equipment, but it was quite impossible to take more than a cursory glance at this section. So vast is the organization at Watson House that many visits could be paid without exhausting the ground.

A later visit was arranged for a few members to Kensal House. As an introduction a short talk on the planning and organization of the estate was given by Miss Wright.

The first visit was to the Nursery School for children from two to five years, built around the old gasholder. The utmost care is taken to ensure that the children are brought up to realize the necessity of cleanliness and hygiene. Each child has its own emblem, in lieu of a nameplate, which is used on all its particular property. Lockers are provided with ventilation holes at the base through which the heat from the gas pipes can dry any damp clothes. Each child is also provided with a tooth brush, tooth mug, face flannel, and towel. The hot water tap is most ingeniously devised to prevent scalding. The rooms are warmed by overhead radiant panels. So excellent is this way of heating that the folding windows are kept open all the year round.

One of the three-bedroomed flats was next visited. These flats are very up-to-date and labour-saving. The kitchens would be a paradise to any housewife. The sitting rooms, which must be extremely cosy in winter with their coke fires, all have balconies, while in addition there is a specially ventilated balcony, off the kitchen, for drying clothes. The bedrooms are bright and airy, with their artistically distempered walls.

A social club with canteen, library, and stage is part of the scheme of this estate, while a room is set aside for the use of the adolescent members of the community, where they can run their own organizations. A special room is also provided for the men equipped for carpentry, boot-repairing, &c.

M. C. M.

Lostwithiel's New Showrooms

Early History Recalled

The Lostwithiel Gas Light and Coke Company has opened new showrooms in Fore Street.

Alderman J. H. Jeffery, Chairman of the Company, who presided at the ceremony on Nov. 24, briefly surveyed the history of the gas undertaking in Lostwithiel. After welcoming the guests and introducing Mrs. S. J. Ingram, of Truro, wife of the Chairman of the South-Western Gas and Water Corporation—who was deputizing for Lieut.-Col. R. L. Norrington, Chairman of the Plymouth and Stonehouse Gas Light and Coke Company, who was to have opened the showrooms—Alderman Jeffery said the Lostwithiel Company had that day turned a new page in its history. Looking up the early minutes of the Company he found that about the time of the opening of the Cornwall Railway through the county some 12 or 13 Lostwithiel business men wanted to bring Lostwithiel into line with the rest of England. On August 25, 1858, they called a public meeting at the Grammar School to consider the formation of a gas company. The grammar schoolmaster was the Secretary. Gas-making plant was ordered to make enough gas for 150 to 200 lights and the capital of the company was £1,000. Alderman Jeffery recalled that he became a Director of the Company in 1903, and in 1905 was elected Chairman on the death of Mr. Richard Reed. Alderman Jeffery traced the further development of the Company until in 1934 it became associated with the South-Western Gas and Water Corporation, of which Mr. S. F. Ingram was Chairman. After paying tribute to the fine work of Mr. J. C. Cotterill, of St. Austell, for gas undertakings in the district, Alderman Jeffery added a hope that the Lostwithiel public would abundantly use the showrooms.

Declaring the showrooms open, Mrs. S. F. Ingram said she could not help comparing that fine building with buildings which served the average gas company 20 years ago, when a consumer on her own initiative went to a gas works and was usually shown a piled up stock of appliances, often covered with dust. The position had now changed beyond recognition. There was a wider range of more attractive appliances and a better service. She congratulated the Lostwithiel Gas Company on their

enterprise and complimented Mr. Cotterill, the Engineer, and Mr. Bartlett, and the staff upon the good results achieved by them.

The building is attractively finished with snowcrete front, with the Company's name boldly set out in red lettering. The interior makes an attractive showroom for the effective display of all kinds of cookers, fires, multipoint water heaters, and lighting fittings with attractive shades.

The Company entertained nearly 300 people at tea in the Church Room, where Alderman Jeffery, introducing Mr. Ingram, spoke of the Company's motto as "Service." In his speech Mr. Ingram congratulated the Lostwithiel Company on their progressive development and said the Corporation of which he was Chairman had placed its resources at the service of Lostwithiel, taking care that the Lostwithiel Company did not lose its identity.

Alderman R. Santo, one of the Lostwithiel Company's Directors, moved a comprehensive vote of thanks, especially mentioning Mr. and Mrs. Ingram. Mr. W. H. Brewer seconded, and Mr. J. Jones, who reconstructed the building for use as a showroom, added his congratulations to the Lostwithiel Gas Company.

Mayoress' First Public Function

Opens Gas Exhibition

Cookery demonstrations recently arranged by the Buxton Gas Department in conjunction with Radiation Ltd., were held at the Gas Service Buildings. So great was the interest created that on the opening day the hall was besieged by Buxton housewives, and many were unable to gain admittance. The Gas Department is to be congratulated upon the fact that the new Mayoress performed the first public function of her year in opening the Exhibition.

The lectures were by Miss Goldsworthy, of the Radiation Research Kitchen, who planned an interesting syllabus for the whole of the week, including seasonable Christmas items. The Gas Department are certainly doing their best to interest and to give service to their consumers. A sporting event was arranged of a ballot for food items cooked each day, and, as a further attraction of one of the latest gas matches was given free with all "New World" cookers purchased during the demonstration period. In addition, they have introduced further improvements in their gas service and, more important still, reductions in the rates of gas in the town.

Grass Drying with Coke for the Small Farmer

By Thomas E. Parry, B.Sc.(Eng.), Assoc.M.Inst.Gas E.,
Bingley Gas Department

The various plant developed so far for the drying of grass is too expensive for the small farmer, so that a small unit requiring no mechanical equipment and which could be constructed in an old barn may be of interest.

Two experiments have been carried out at Bingley—the first being associated with the drying of grass for the enrichment of its protein value and the second with the drying of bread for the preparation of sausage meat. In both experiments natural draught drying was used to promote simplicity. The scene of operations was an old malt kiln having a floor 30 ft. by 17 ft., 14 ft. above ground level. The floor was constructed of perforated tiles carried on light steel joists, and was heated by two open coke fires 11 ft. below the drying floor. 1,200 lb. of wet grass were spread to a depth of 8 in., the density being about 3½ lb. per cu.ft. This was dried off in four hours, 180 lb. of dried grass being produced. Crude protein before drying was 2·8%, and this percentage rose to 13·7 after drying. Taking approximations for the sensible heat in the floor and walls and incandescent coke, the coke consumption was roughly 500 lb.

The 1,020 lb. of moisture driven off during vaporization would absorb something like 1,125,000 B.Th.U., giving a rough theoretical coke consumption of 100 lb. The efficiency is, therefore, very low, and is likely to remain so, even with modifications, but the process is still attractive in view of the valuable properties of dried grass. For instance, it has been estimated that if you feed a hen 1 lb. per month it will increase her production by 10 dozen eggs per year and on less total feed than she would otherwise eat. Hence the process is definitely an economic one, given favourable circumstances.

In drying bread for the manufacture of sausage meal it was found that the use of coke gave the bread an acidic flavour, so experiments were made with gas as the heating medium. A grid of ¾ in. pipes drilled with 3/32 in. holes at 12 in. intervals was placed 3 ft. below the drying floor. Taking into account the shape of the vapour pressure curve, it seemed desirable to obtain as high a temperature as possible while avoiding discoloration of the bread. So after the first test the number of holes was doubled and the holes staggered on each side of the pipes. By this means, although the rate of consumption went up from 500 to 800 cu.ft. per hour, the total consumption came down from 10,000 to 7,000 cu.ft. per drying of one ton of bread. Owing to the warm ascending current being partly saturated by the combustion of the gas, about 2,500 cu.ft. is theoretically necessary to dry off the 35-40% moisture in the bread. Thus the efficiency of the process is reasonably good, the taste of the bread quite neutral and pleasant, and the cost of the equipment under ten pounds. The process has been adopted and represents a load of over 1 million cu.ft. a year.

Gas Floodlights Leamington College

The above photograph (by the *Leamington Spa Courier*) shows a view of the Leamington College floodlighted by gas, an installation which, we understand, has given complete satisfaction to the Authorities. The frontage of the College is 156 ft., and the floodlighting was carried out by means of six 14-light No. 2 mantle alignment lamps placed in line on the grass about 35 ft. back from the face of the building. Mr. R. S. Ramsden (Engineer and Manager of the Leamington Priors Gas Company) informs us that at the present time a local builder and house agent are also floodlighting a typical new modern house for sale with similar equipment.

Mechanical World Year Book*

1938 Edition

Electric arc welding has developed to the stage where the details of application and the user's point of view are of importance. It is at this opportune time, therefore, that there is included an entirely new section on the subject in the "Mechanical World Year Book." It describes the types and properties of electrodes, explains the process in detail, and gives directions for the various methods of welding and for welding in different positions. Welding design is also fully treated, methods of calculation being given for butt and fillet welds.

Pursuing the scheme outlined in a previous edition—of alternating sections so that any two consecutive editions provide a greater store of data—there has been brought back into the new edition the section on Presswork which was omitted from the edition for 1937. The metals and alloys section has been omitted from the new edition, but will reappear in due course in revised form. General detail revision has been made as usual, and the index has been extended.

* London: Emmott & Co., Ltd., 28, Bedford Street, W.C. 2; price 1s, 6d.

New Showrooms Opened at Lewes

Attractive new showrooms were opened by the Lewes Gas Company on Dec. 7—a further indication of the influence of the South-Eastern Gas Corporation on its subsidiary undertakings. The ceremony was performed by the Mayor, and was attended by a representative gathering of guests, presided over by Mr. R. W. Foot (a Director of the Company) in the unavoidable absence of Sir David Milne-Watson (the Chairman).

We have not had the opportunity of inspecting the original showrooms of the Lewes Gas Company, though we are given to understand they were tucked away in a "dirty corner"—this expression was used by a local resident—at or adjacent to the gas-works. In any case, the townspeople of the ancient Borough of Lewes may well be proud of the new building, not merely because it greatly enhances the architectural dignity of the High Street, but also because it brings the Gas Undertaking's "service centre" conveniently into the principal shopping area and provides a showroom window which will draw attention to the wide range of modern gas appliances displayed therein.

The new showroom is a single storied structure, though provision has been made for adding an upper floor should this become necessary in the future. There is, in addition, a basement storeroom approached from the back of the showroom. The street front has been carried out on simple yet dignified, modern lines, which fully conform to the general tone of neighbouring buildings. There is a large amount of window space, which may either be screened off for individual displays or left "open" to give an uninterrupted view of the bright and attractive interior.

The chief impression imparted by the interior is one of businesslike simplicity. There are no "frills"—no awkward corners or niches—no supporting columns to break the harmony of a clear view right down the whole length of the interior. Yet the whole effect is thoroughly modern, due in no small measure to the pleasing green and white colour scheme, the green "streaked" rubber floor covering, the panelled ceiling, broken by a series of opaque glass laylights. The pendent lighting fittings are worthy of particular mention, being of the very latest chromium cluster design—all, of course, switch-controlled. Special attention has been paid to adequate ventilation—an important feature in premises where often an unnecessarily large amount of heat is being given off by various appliances which are being demonstrated. A series of ventilating ducts have been run down either side of the ceiling and across the cross-beams, as well as outlets at the corners of each of the laylights.

The various appliances have been grouped down either side of the showroom, a feature being the beautiful settings in which the different types of gas fires have been arranged. The keynote throughout is *colour*, as shown by the many pleasing hues in which the appliances are finished. Towards the front, in the centre, is the "gadget table," to which useful piece of equipment we are now becoming accustomed in up-to-date gas showrooms. In this case, the sides of the "table" consist of frosted glass, illuminated from within in a very effective manner. Stress is laid upon the convenience with which the many smaller gas appliances can be plugged in to the various points provided around the edge of the "table."

Behind this is the cash desk, where consumers can pay their accounts, while the rear of the showroom has been set out as a small demonstration area, a platform for cookery lectures, &c., being arranged against the back wall. "Pel" nesting chairs are provided for the audience. Behind the platform is a little ante-room, with sink, cupboards, and water heater for the demonstrator, and adjoining this is a comfortably-furnished office for the sales manager. Before leaving the showroom, mention should be made of the admirable water heating display. This is on lines now generally adopted in many showrooms—namely, a composite stainless steel setting, with draining troughs, where examples of the various methods of water heating can be shown in operation.

Downstairs, as we have already mentioned, is a commodious store-room, where second-hand appliances will be on view, together with staff cloak-rooms, &c. It was in this store-room, where a wonderful transformation scene had been effected by means of carpets, flowers, and attractive gas lighting, that the guests of the Company were entertained at tea following the opening ceremony, which was performed by the Mayor with a gold key.

Mr. R. W. Foot (Director of the Lewes Company) presided at tea, supported by Mr. F. E. Hammond (Works Manager), Mr. P. G. Wright (Acting Sales Manager), and other members of the Company's staff. In addition to a representative gathering of members of the Council and prominent local residents, there were also present Mr. C. F. Botley (Engineer and Manager of the Hastings and St. Leonards Gas Company), Mr. P. E. Browne (General Manager of the Brighton, Hove, and Worthing Gas Company), and other representatives of neighbouring gas undertakings.

In the course of a few remarks, Mr. Foot first expressed the regrets which Sir David Milne-Watson (Chairman of the Company) felt in being unable to be present on that occasion. We would have been with them had it not been for an important conference in London. Sir David Milne-Watson was a very distinguished figure in the Gas Industry, said Mr. Foot; he had occupied for many years the position of Governor of the Gas Light and Coke Company—the largest gas undertaking in the world. He was also the leader of the Industry's National Bodies. Sir David had asked him to say that while he was proud to be Chairman of the largest gas undertaking, he was no less proud to be appointed Chairman of the Lewes Company.

The members of the Board of the Lewes Company were proud to be responsible for the gas supply in that historic old town, with all its famous associations. They appreciated the presence there on that occasion not only of the Mayor but also many Councillors and distinguished residents, while they also had with them several colleagues from neighbouring gas undertakings—who, he added, amid laughter, had probably come there to see what modern showrooms should be like! The Lewes Gas Company had been serving the town since 1822, and during the whole period the supply had never once ceased; the Company had a proud record behind it and there had been many important events in its history; but not least important was its passing into the hands of the South Eastern Gas Corporation in 1935, which Corporation was closely linked with the Gas Light and Coke Company, and the latter Company (of which, Mr. Foot observed, in his more leisured hours he was General Manager) was very proud of that connection. They felt, and he hoped that those present that day would feel, that there was some value in the Lewes Company being connected in this way with the largest gas undertaking in the world; and perhaps those who had watched the progress of the Lewes Company since 1935 would have seen some signs of development as a result of that connection. But although this connection had been established with the South Eastern Gas Corporation, the local prestige and entity of the Lewes Gas Company had remained intact. They still had some of the original Directors on the Board, while all the employees were as happy as, perhaps happier than, before. Indeed, one very important development had been the introduction of a pension scheme for the staff.

Mr. Foot went on to refer to other recent developments and to the Company's wish to assist its consumers in every possible way through these new showrooms, from which they wanted to get the fullest use. In conclusion, he thanked the Mayor for his presence on that occasion and for declaring their new premises open, adding his congratulations to Alderman Hall on his occupancy of the distinguished position of Mayor of Lewes for the third time.

His Worship the Mayor thanked the Company for their hospitality and added his own praise of the new premises. He referred to his own early connection with the Company, having been indentured to one of the gas collectors after leaving school in about 1872. He expressed the hope that the Company would benefit from their enterprise.

The Rural Dean voiced the thanks of those present to the Company, remarking that he regarded this development as a very useful one and hoped it would be of great service.

Mr. Foot briefly acknowledged the expressions of thanks, and referred to the fact that although their coal was costing 4s. to 5s. more per ton the price of gas in Lewes had not been raised, and they were hopeful of getting through the present period of rising costs without having to raise their price.

The Lewes showroom, which follows closely that built recently at Southborough for the Tunbridge Wells Gas Company (another subsidiary of the South-Eastern Gas Corporation), was designed by Messrs. Philpot & Lovell, Architects, of Tunbridge Wells, and erected by the Ringmer Building Works. We understand widespread reorganization of the sales side is due to take place at Lewes in conjunction with the new premises.

French Gas Industry

Review of the 60th Congress of the Union Syndicale de l'Industrie Technique du Gaz en France

Continued from p. 669.

Method for the Calculation of Gas Distribution Systems

G. Combet described a method by means of which the most economical pipe diameters for a distribution system may be chosen and the optimum intermediate pressures may be fixed.

The usual method—a tedious one—is that of trial and error—calculations based on a series of assumed pipe diameters or combinations of pipe diameters depending on whether transmission between two points only or distribution to a number of centres of consumption is involved. A simplified method is described. Firstly it is shown that any distribution system, however complicated, may be rapidly reduced to an equivalent simple system in which gas is conveyed between two points. The next step is the determination of the economical pipe diameter and emission pressure for this simple system. Finally, an example, based on a concrete case, is worked out.

The justifiable assumption is made that the installation costs of a given length of main bear a linear relationship to the pipe diameter. Then if L=length of pipe, Q=volume of gas per hour, D=pipe diameter, p_1 and p_2=initial and final pressures, and $a = l.\sqrt[3]{Q}$ = the intrinsic coefficient of the section, we have $Q^2L=KD^4(p_1^2-p_2^2)$. Also, the installation cost varies as LD, *i.e.*, as $\sqrt[5]{Q^2L^6/(p_1^2-p_2^2)}$, *i.e.*, as $\sqrt[5]{a^6/p_1^2-p_2^2}$ (Expression 1).

Thus if the initial and final pressures are fixed, the installation cost is similar for all systems having the same coefficient. The above expression is applicable to high pressure gas distribution. It becomes somewhat simpler for low pressure distribution.

It is shown that, in the case of a simple branched service supplying gas from a point E (pressure P) to a point D (pressure x) and thence to three points A, B, and C at which the pressure is p, the economic pressure at D may be deduced by differentiating $\Sigma\sqrt[5]{a^6/p_1^2-p_2^2}$ for the four sections involved and equating to zero. When this economic pressure is substituted in $\Sigma\sqrt[5]{a^6/p_1^2-p_2^2}$ and the expression is simplified an expression analogous to expression 1 is obtained, but containing a resultant coefficient for the complex system in place of the intrinsic coefficient which characterizes a simple system. Hence the minimum installation cost for the network is equal to that of a single system having an intrinsic coefficient equal to that of the resultant coefficient of the network.

The theory is elaborated with reference to more complicated systems for details of which reference must be made to the original Paper.

Note on the Economic Pipe Diameter and Velocity of Gas Flow in Long Distance Gas Transmission

L. Marchal described a simplified procedure which may be employed in the planning of transmission systems. The case discussed is that of a supply of gas to a relay holder.

The factors involved are (1) the average rate of flow, Q, (2) the daily number of hours, t, of working of the booster station, (3) the length, L, of the system, (4) the annual rate, a, of amortization *plus* interest on the installation costs of the main, (5) the cost, b, of installation of unit length of main of unit diameter, (6) the cost, c, of power per unit, (7) the specific gravity, d, of the gas, and (8) the efficiency, r, of the booster and motor.

The unknown factors are the pressure drop and the main diameter required for minimum transmission costs.

For low pressure conditions and with Monnier's flow formula as the basis, differentiation of an expression deduced for the total annual costs of transmission leads to the conclusion that the most economical diameter is such that the annual interest *plus* amortization charges of the system is equal to five times the annual cost of the power required. This rule is analogous to one derived by Kelvin for the transmission of current.

Corresponding to the economic main diameter is an economic gas velocity. The two relationships are:

Economic diameter = $\sqrt{Q}\ \sqrt[5]{a\,t\,c/a\,b\,r} \times$ a constant depending on the units.

Economic velocity = $\sqrt[3]{a\,b\,r/d\,t\,c} \times$ a constant depending on the units.

The economic velocity is thus independent of the average rate of flow and the economic diameter is independent of the length of the system.

The formula may be simplified if certain basic values are taken for some of the variables, for example, 0·5 for the specific gravity of the gas, 0·5 for the efficiency of the booster and motor, 8% for amortization *plus* interest, and appropriate figures for the installation costs of unit length of main of unit diameter, power, and number of hours of daily running.

It is then found that the economic diameter is given by the expression $K\sqrt{Q}$ (where K is a constant) and the economic velocity becomes 25 ft. per second. Thus for low pressure feeder mains with an initial pressure not exceeding 80 in. W.G. and for the basic conditions in question, the economic diameter is such that the gas has a velocity equal to this figure.

Similar considerations are applied in the case of high-pressure distribution though the relationships are a little more complicated. Calculations are simplified by use of a table and nomogram included in the Paper.

Reports of Committees

Manufacture.—Work has been continued, during the past year, on the study of the control of certain of the characteristics of gas. It is judged necessary that methods and technique should be standardized so that the results obtained in different laboratories may be comparable.

A general study of producers both of the built-in and of the external types is to be undertaken. To this end, a questionnaire has been addressed to Gas Companies.

Distribution.—The final sections of the Manual of Gas Distribution to Residences have been completed and cover internal installations, their installation and testing.

The series of service tests on rubber gaskets is now in its second stage, and further samples have been removed for examination after an extended period of use.

The reasons which led the Committee to condemn official proposals for the compulsory connection of lightning conductors to gas services are detailed.

Tar, Benzole, and By-products.—The report presents a resumé of the methods which have been proposed for the recovery of sulphur from gas. In connection with dry purification, reference is made to the recovery of sulphur from spent oxide by roasting and by solvent extraction. Brief descriptions are given of various liquid purification processes, namely, the Alkazid, Feld. Burkheiser, C.A.S., Petit, Auto, Thylox, Bahr, Rostin, Fischer, Girdler, Seabord, Gesellschaft für Kohlentechnik, and Léonet processes and of the active carbon process, with an indication as to where they are at work. Hitherto the Gas Industry in France has given but little attention to sulphur recovery, though interest is awakening.

Propaganda.—New regulations governing the stamping of certain appliances are scheduled. A survey is given of replies received from gas undertakings relative to their practice in connection with the evacuation of the combustion products from gas appliances. The enquiry has not yet been completed, since only a small proportion of the undertakings have furnished information.

New appliances deemed worthy of being brought to the notice of the Gas Industry comprise a thermostatic regulator for space heaters (Société Gas et Chaleur), a safety valve which prevents faulty manœuvres when an appliance is lit up and ensures automatic extinction of the gas if the gas supply or the pilot flame fails (Etablissements Pain), a mixing carburettor for gas-driven motor vehicles (Association du Carburateur G.R.), and an instantaneous water heater which provides boiling water but necessitates a supply of softened water (Société Ico).

(To be continued.)

The Ceramic Society

The Autumn Meeting of the Refractory Materials Section of the Ceramic Society was held on Nov. 17 and 18 in the Rooms of the Federation of British Industries, Westminster, the chair being occupied by Mr. C. R. L. Threlfall. Among the more important contributions was "A Note on the Reliability of Thermal Conductivity Measurements for Insulating Materials," by Mr. H. Oliver. In this the results obtained in numerous experiments are tabulated and discussed, and it seems clear that even from an investigation of so small a range there is liable to be want of concordance in the values obtained by different testers for the thermal conductivity of insulating material. It is stressed that values for thermal conductivity can only be safely compared if they have been obtained under comparable conditions of testing, and that calculation of heat loss through a wall of firebrick and insulating material may differ by about 10%.

The Author gives the following brief summary:

Samples of practically identical diatomaceous insulating materials have been tested for thermal conductivity by three independent authorities and the results compared with those obtained by the Author on the same bricks.

It has been shown that a reasonable degree of concordance in results may be obtained by a particular apparatus. It has also been shown that discrepancies are liable to occur between the results reported by the different testing laboratories of an order which is, in some instances, considerably greater than that covering the limits of reproduction of an aparatus. This indicates that some tolerance should be used when making comparisons of the relative insulating efficiency of samples of this class of material from the thermal conductivity values.

A communication from the Central Research Department of the United Steel Companies, Ltd., was entitled "The Testing and Properties of Heat Insulating Materials," by Dr. A. H. Jay and Mr. L. Lee. Tests are described which may be adopted to estimate the usefulness of insulating products, and the properties of some thirty materials are tabulated. The main considerations are thermal conductivity, maximum safe temperature, and crushing strength. Special attention is drawn to "maximum safe temperature," which, after thermal conductivity, is the chief factor controlling the correct application of heat insulating materials.

To insulate a furnace economically involves the estimation of possible heat saving, and such calculations would enable some idea to be formed as to the type of insulating material necessary in a particular case. The properties of the insulating material desired could then be specified. In calculating the maximum safe temperature at the interface of the refractory and insulation, the minimum thickness of the main refractory (resulting from normal wear to the permissible limit) should be used.

The Authors' conclusions are:

(1) The thermal conductivity of commercial insulating bricks having a maximum safe temperature of not more than 1,000° C. is of the order of 2·0 B.Th.U.

(2) Provided an insulating brick has reasonable thermal resistance, the most important consideration is maximum safe temperature.

(3) The crushing strength of insulating materials is low compared with that of less porous refractories.

(4) The choice of an insulating material for a given purpose can be made by use of data such as those given above, in particular the value of thermal conductivity, maximum safe temperature, and crushing strength, together with a comparison of costs in relation to heat saving.

In "Comments on the After-contraction Test for Fireclay Bricks," Mr. H. D. Bennie observes that the test has stood unaltered in its method of manipulating for 25 years, and, so far as fireclay bricks are concerned, its value is unquestioned to date. The Author suggests that the linear measure of test pieces is insufficiently certain of accuracy to meet the requirements of modern industrial usage. The following cases are cited by Mr. Bennie, who adds that there may be other varieties of similar difficulty:

(*a*) In heavily grogged bricks which are imperfectly bonded, the comparatively large grog-grains sometimes move or suffer volume changes independently of the test-piece as a whole, and it is found impossible to refit the callipers along the marked position as directed in the specification.

(*b*) Fireclay bricks subject to "iron-spotting," either as fired or during test heating, may produce small local "bloats" due to intumescence of the iron spots, and, if this occurs along the marked position, it will not be possible to refit the callipers after test heating.

(*c*) Some fireclay bricks, although capable of passing the refractoriness and refractoriness safety tests for Grade 1 material, are liable to suffer slight distortion under the test heating. It will not be possible to refit callipers in such cases, as the ends of the test-pieces will not be truly parallel after test-heating.

It is suggested that measurement of the volume of the test-piece before and after test heating will be more accurate than any linear measurement, and the Author has designed a volumeter for this purpose. From the percentage volume change can be obtained the percentage linear change; in most cases merely dividing the volume change by three gives the linear change very nearly.

The proposed method of measurement is claimed to provide reliable results, whether bloating, distortion, or other disturbing influences take place or not, and to save time by obviating the need for parallel grinding of the test-pieces. Also, by weighing the tested specimens before and after heating, the change (if any) of bulk density can be ascertained and reported.

New Books

Handbook of the Gas Industry*

It is many years since the appearance of Bunte and Schilling's "Handbuch der Gastechnik," a monumental work which has been of great use to gas engineers during the post-war period. An equally comprehensive and up-to-date work entitled "Handbuch der Gasindustrie" is now in course of preparation by the publishers whose imprint appeared on the earlier manual. It will include six volumes dealing respectively with Carbonizing Plant; Producers and Generators; Purification and By-Product Recovery; Storage, Metering, and Distribution; Methods of Analysis and Test; and Technical Gases and their Properties; while a seventh volume will comprise an Author, Subject, and Patent Index. As in the case of the former work, the new treatise is sponsored by the Gasinstitut of Karlsruhe, the present editor being Dr. Horst Brückner, who is not only the Author of the volume now under review but is contributing portions of the remainder of the work.

Intending purchasers of the handbook have two courses open to them. They can either acquire the treatise at a subscription price, in which case they will be supplied with instalments as issued at a price of 1 RM. per 16 pages, or they can buy completed volumes at an enhanced price. Those adopting the former alternative will obviously be in a position to derive early benefit from the up-to-date information included in the work. It is contemplated that the treatise will consist of about 2,880 pages or 180 sets of 16 pages and that the number of sets of pages issued in any month will be 10 or less, the intention being to complete the work by 1939. Instalment purchasers will be supplied with binding cases free of charge.

The publication of the treatise has now commenced with the issue of Volume 6, in the case of which an exception to the general programme has been made since the volume is available in complete form. The volume in question is divided into two sections devoted respectively to Gas Tables (physical, thermodynamic, and combustion properties of gases) and to Miscellaneous Technical Gases. The publishers have realized that the Gas Tables will make an appeal to a very wide circle and they have wisely decided to issue a separate edition of this portion of the volume.

The Gas Tables are divided into 43 sections, many of which have numerous subdivisions. In view of this, it is impracticable to give a full indication of their very wide scope. It may, however, be mentioned that much more information is presented than would be gathered from the

* Handbuch der Gasindustrie, edited by H. Brückner. Volume 6, Technische Gase und deren Eigenschaften, by H. Brückner. [Munich and Berlin, 1937, R. Oldenbourg. Pp. xii. + 146 (Gastafeln) and ii. + 206 (Sonstige technische Gase). Price, bound, RM. 22.85 (by subscription), RM. 27.50 (to general public). Price of Gastafeln, only, RM. 12, bound.]

title, since tables or portions of the text are devoted to the properties of water, metals, refractories, acids, and alkalis, the compressibility of liquids, the laws of heat transfer, test sieves, &c.

The information on the properties of gases is fully up-to-date, as will be evident from the fact that Justi's specific heats and the latest international steam tables are presented. In connection with flame temperature, simplified methods are given for the evaluation of the effects of dissociation, while the section on the combustion properties of gases provides a useful summary of recent work carried out in the Gasinstitut.

The second portion of the volume is, as has been indicated, devoted to miscellaneous technical gases. It opens with a chapter on low-temperature carbonization in which a description of the Coalite, Brennstoff-Technik, Krupp-Lurgi, Berg, Hinselmann, Otto, and other processes is given and reference is also made to coal-in-oil processes.

Then follow sections on methane, liquefied propane and butane, oil gas, petrol-air gas, the liquefaction of air, oxygen, nitrogen, the noble gases, the fractionation of coal gas by liquefaction, carbon monoxide, and hydrogen. Much of the information is of recent origin. Methane and natural gas are treated at ample length in a chapter extending to nearly 50 pages, the various processes employed for the elimination of sulphuretted hydrogen, the removal of condensable hydrocarbons, and the re-forming of the gas being described as well as the formation of methane by the fermentation of sewage and the catalytic production of methane by the reduction of the oxides of carbon. Nearly 40 pages are devoted to hydrogen and about 20 pages to oxygen. The recent Linde-Fränkl process is, as would be expected, described in detail, and information is also given on the storage and distribution of liquid oxygen.

A few mistakes have been noticed. It should, however, be possible to include lists of errata with each of the forthcoming instalments of the treatise. Purchasers would then be in a position to make the appropriate alterations.

If subsequent volumes are as good as this initial volume, the new treatise should prove an invaluable aid to gas engineers both as a reference book and for daily use. It goes without saying that the publishers have maintained the high standard of production which is characteristic of their technical literature.

Gas and Water Engineers' Calendar, 1938*

Once again we have, in the arrival of a new edition of this well-known annual, a timely reminder that a new year will shortly begin. The 1938 edition of the Calendar maintains its old-established form apart from alterations necessitated by the inevitable changes of personnel, statistics of production, and new legislation.

In the preface, reference is made to some of the effects of the Four Years' Plan. Stations for the supply of compressed coal gas or methane in Germany now number thirty-seven, while twelve more are under construction. In Berlin, a whole line of motor omnibuses has been operated on compressed gas since the beginning of the year.

Sulphur recovery combined with solvent extraction has made such strides that completed and partly constructed installations will shortly be able to meet a large proportion of Germany's sulphur requirements. In the campaign against waste, gas refrigerators are playing an important part.

It is noted that the German Association of Gas and Water Engineers is now affiliated to the National Socialist League of German Technology.

Once more it must be recorded that a new edition of the technical and scientific volume of the Calendar has not been issued. It is, however, pleasing to note that a new edition superseding the 1932 edition is in course of preparation.

The Calendar continues to remain an indispensable work of reference of a unique kind.

* Kalender für das Gas- und Wasserfach. I. Teil; Kalender Teil. 61st Edition, 1938. [Munich and Berlin, 1938, R. Oldenbourg. Pp. 448. Price RM. 5, bound.]

Fuels for Heating and Hot Water Supply

An Interesting Discussion

A lively discussion on the relative merits of oil and coal as fuels for heating and hot water supply, in which reference was made to gas, coke, and electricity, followed the reading of two Papers at a Joint Meeting of the Institute of Fuel and the Institution of Heating and Ventilating Engineers in the Meeting Room of the Institution of Mechanical Engineers, Storey's Gate, S.W. 1, on Dec. 1. These two Papers were presented by Mr. I. Lubbock, A.M.I.Mech.E., and Mr. H. L. Pirie, M.I.Mech.E. The Chair was taken by the President of the Institution of Heating and Ventilating Engineers, Mr. C. R. Allensby. In the course of his Paper, which was entitled "Fuel Oil for Heating and Hot Water Supply," Mr. Lubbock observed that fuel oil had been used for heating buildings in this country for many years and had become firmly established as a successful and attractive fuel for this purpose and the associated one of domestic hot water supply. In presenting the advantages of fuel oil, the Author did not rule out the fact that gas, and, to a certain extent, electricity, had in many cases similar advantages. It was merely a case of the owner weighing up a number of factors in each individual case and deciding whether or not this or that fuel would suit his requirements best. The advantages which he claimed for oil were space occupied by plant and fuel, rapid filling of storage, distribution to multiple boilers, cleanliness, smoke abatement, flexibility, standby losses, completely automatic systems, and thermal efficiency. He suggested that it would be beyond the capacity of gas mains to heat a building of the size of Shell-Mex House, where the boiler capacity actually reached 50 million B.Th.U. per hour in the heating of the building, which had a gross external volume of 7,500,000 cu.ft. A general conclusion put forward by the Author was that oil as a fuel for central heating and hot water has come to stay and occupies a legitimate place in the national system, and the manufacture of oil-burning apparatus is now established as an important British industry with a high reputation throughout the world.

Gas Ideal When "Price is Right."

In dealing with "Coal and Its Derivatives for Heating and Hot Water Supply," Mr. Pirie, who is Chief Engineer to the Coal Utilization Council, called attention to the fact that the coal industry is fully alive to the increasing demand for sized, clean coals, and, he said, greatly improved methods of preparation have been adopted by nearly all collieries, including washing, screening, and grading. Briefly disposing of coke, Mr. Pirie dealt even more summarily with gas and electricity in stating simply that they might be regarded as derivatives of coal, and it was to be noted that they were smokeless at the point of consumption. On the question of space heating, he deprecated attempts to obtain comparative costs of direct heating by means of solid fuel, gas, and electricity, because, in his opinion, each of these fuels has its own field of usefulness, and one is not invariably a satisfactory substitute for the other. He did urge, however, that the occupier should have free choice in the selection of fuel, and this is denied him if his residence is built without flues or without adequate storage accommodation. Gas, and also electric, immersion heaters, he suggested, are a great convenience for summer use in the home when a fire is not required. Also, where comparatively small quantities of hot water are required intermittently they are to be recommended. After describing some recent coal-fired installations for central heating and hot water supply, Mr. Pirie concluded by conceding, albeit very shortly, that increasing use is being made of gas and electricity for central heating purposes, and when "the price is right" they are ideal for this purpose.

The discussion which followed was largely occupied with differences between the coal and oil interests, stray shots, apart from references in the Papers, being rather more responsible for any statement concerning gas and coke than any preconceived case for the advocation of these fuels. The discussion was opened by Mr. W. Selvey, Vice-President of the Institute of Fuel, who explained that his experience with oil-fired boilers had not been very happy. Mr. Pirie, he remarked, had been caution personified; he had had a great opportunity of going into the merits of small automatic coal stokers. There had been a great deal of untoward experience with these stokers. Coal, suggested the speaker, was a somewhat catholic term, and these stokers did not like cast-iron or bits of shale! Dr. G. W. Himus complained of the lack of information that was forthcoming from those selling coal. Salesmanship

was one of the great advantages of the oil industry in getting their product into the hands of the consumer. He pointed out to Mr. Pirie that "Coalite" could be burnt quite successfully in an ordinary well grate. He would, however, like to know what was a reasonable moisture content for this fuel. Mr. John Roberts pointed out that the disadvantages of dependence on foreign oil had not been mentioned by Mr. Lubbock. When, he observed, every other country was becoming independent of imported oil supplies, it would be a mistake of the first magnitude for Britain to adopt any other policy. It should be their duty to develop the fuel sources of the country during times of peace.

The Case for Gas and Coke.

The Secretary of the Institute of Fuel then read a written contribution from Dr. G. E. Foxwell, in which it was pointed out that all oven cokes could not be placed in the free-burning class, for that would lead to coke getting a bad name when used for unsuitable purposes. It was apparent from Mr. Pirie's statement that gas was smokeless at the point of utilization that he had kept himself incompletely informed on the manufacture of gas in continuous vertical retorts. He would like to underline the statement regarding the domestic servant, for the whole tendency nowadays was to avoid domestic labour. The public would demand fuel on tap, and gas provided the ideal solution. He countered the advantages claimed for oil by Mr. Lubbock by a statement of the advantages of gas, and observed that while it was possible to make smoke with oil, that was impossible with gas. Further, gas was the equal of oil in the matter of thermal efficiency. Coke was also the equal of oil in a number of the respects cited in the Paper as being the advantages of oil. In addition, storage space could be saved with gravity-feed coke boilers and refuse could be destroyed in the coke boiler. If a combination of gas and coke were used the cost generally was brought well within the limit of present-day gas practice as compared with the cost and ease of use of coal or oil. Moreover, if one were to visualize the all-gas house, some method of total gasification must be adopted. He had yet to find any method of total gasification which would produce gas of an acceptable calorific value for town purposes sufficiently cheaply, and that was one of the problems which the Gas Industry had to face. Nevertheless, when he considered the colossal increase in gas consumption that would follow any considerable adoption of the all-gas house, it was his personal feeling that the Gas Industry should be prepared to take a certain amount of risk by selling gas to all-gas houses at practically cost price. They would soon find, by reason of the greater scale of their operations, that they were making a profit at these prices because the greatly increased gas consumption would be spread over the same distributing and sales staff, the same management, and the manufacturing operations would be on a larger scale and, therefore, on a more economic scale. Mr. Laws pointed out that a great deal of the moisture was picked up after coke had left the gasworks; it was extraneous, and therefore cost the consumer nothing. Mr. A. H. Barker suggested that it ought to be made a criminal offence for coke to be sold with a moisture content in excess of a certain amount.

In the course of his reply, Mr. Pirie, on the question of coal salesmanship, pointed out that a well-known organization had started a coal selling course and had now enrolled between six and seven hundred people. In reply to Dr. Foxwell, he agreed that gas had certain advantages, but maintained that it was very costly.

The meeting was concluded with a hearty vote of thanks to the Authors for their Papers proposed by the Vice-President of the Institution of Heating and Ventilating Engineers, Mr. G. Nelson Hayden.

Town Gas as an Industrial Fuel

We publish below a report of the discussion which followed Dr. C. M. Walter's Paper read before a Joint Meeting of the Manchester District Association of Gas Engineers and the Institute of Fuel at Manchester on Nov. 24. The Paper itself was dealt with in last week's "JOURNAL."

Dr. ALEX. FELLS (Sheffield) said that, as Dr. Walter had mentioned, Sheffield manufacturers used 5,565 million cu.ft. of gas for industrial heating purposes in 1936, an increase of over 3,000 million cu.ft. since 1931. The consumption of gas up to date this year already showed a further increase of well over 1,000 million cu.ft. over the figures for 1936. The bulk of that gas was used in the many re-heating and heat-treatment processes necessary for the fabrication of steel goods. The considerations governing the choice of fuel for those two main divisions of heating—*i.e.*, re-heating and heat-treatment—were fundamentally different. In re-heating, the cost of fuel per ton of metal heated, calculated over a long period of working, was the first consideration. In heat-treatment, the cost of fuel per unit weight of material heated was a progressively less important item as the material approached its finished form. Re-heating was carried out in order that the steel might be changed in form or shape by such mechanical processes as forging, drop-stamping, and rolling, while heat-treatment was done in order to give the steel some particular internal structure which determined largely its quality for the ultimate purpose it had to fulfil.

In re-heating it had been the practice ever since steel was made to use solid fuel, either direct in small furnaces or converted to producer gas for large furnaces or batteries of furnaces. There was no need for him to recite the many difficulties attendant upon the use of solid fuel or producer gas. Those difficulties had been such that every fuel technologist, and the management of all firms with any pretensions to being progressive, had wished for a constant supply of clean, gaseous fuel, ready to use at a moment's notice, and capable of being used with every regard to the minimizing of labour, reduction of capital outlay, and reduction of standing charges on fuel storage space and fuel preparation plant.

The surplus gas from coke ovens was obviously the source of such fuel and after many years of patient negotiation by the Sheffield Gas Company with the major steel companies, the coke oven industry, and the Government, that gas was rendered available through the recently formed South Yorkshire Gas Grid, owned and operated by the Sheffield Gas Company.

Since the inception of the Gas Grid the demand for coke oven gas had fully justified the work involved. He would not go into detail, except to say that the coke oven gas was sold at such a price, and was used in such types of modern furnace, that the cost of re-heating steel was in most cases actually competitive on a thermal basis with producer gas, and even with solid fuel. In those cases which might be cited as showing increased thermal cost with the use of coke oven gas, the other added advantages, such as ease of control, adaptability, and maintenance of high output rates, readily influenced the choice in favour of town gas.

It should be realized that the large firms engaged principally in heavy engineering were fully conversant with the types of fuel which had been available in the Sheffield area—*i.e.*, coal and coke—with the large scale production of producer gas, and in some cases with pulverized fuel and with oil. They had had many years of experience in the heating of furnaces with those fuels, and in many cases, by training men in the skilful use of those fuels, by using mechanically controlled furnaces and automatic fuel feeders, by using fully automatic producer gas plant, and especially by carefully contracting for coal supplies, they had not only gained sound knowledge of furnace practice with those fuels, but also had reduced the cost of heating to a very low figure. It was such firms who had made the largest use of town gas since the inception of the Gas Grid.

The recent progress in metallurgical practice in several special phases of steel development would not have been so great had town gas not been adopted. The production of stainless steel in the form of sheet and strip and the manufacture of all types of precision tools of high speed steel, of the quality available to-day, owed much to the use of gas-fired furnaces, some types of which were the result of research and development work carried out by the Sheffield Gas Company. In Sheffield the rapid increase in the use of gas for industrial heating was helping the Local Statutory Authority dealing with smoke abatement to a greater extent than was generally acknowledged. He would quote the words of one of Sheffield's leading fuel technologists, connected with one of its largest steel works: "In the works with which the Author is connected, the quantity of gas burned each year is replacing over 40,000 tons of coal, by no means a slight contribution to the favourable solutions of the smoke question." That statement was made a year ago, and since then the firm had made even greater use of town gas. Other firms in the City could give equally convincing figures, and it would be seen that now the opportunity had presented itself in the way of improved trade, and the availability of cheap town gas, Sheffield steel manufacturers were doing much to get rid of black smoke and Sheffield's old stigma.

Mr. H. P. LUPTON (Liverpool) said that in Liverpool they had recently installed immersion heaters, on the Kemp system, for soft metal melting. Liverpool was not a heavy industry area, nevertheless they had been able to introduce gas into foundries for drying floor moulds and for lighting cupola fires. In the case of one foundry the manager claimed a saving of £100 per annum since converting his drying method from a coke grate to a gas radiating burner. Fires for foundry cupolas were generally lighted by paper, oily rags. and wood, or by under-pressure paraffin burners. A gas and air blast burner, consuming 400 cu ft. of gas per hour, had successfully replaced other methods. The cost comparison was: wood 2s., paraffin 4½d., and gas 2½d. per fire.

In regard to drying, and other low-temperature operations,

That SUSSEX Cookers have found great favour with consumers is undoubtedly due to the fact that they are planned to give the best all-round service. The oven is so designed that either a whole meal or a number of similar dishes can be cooked at one time. This, obviously, is a great advantage, and if the various exclusive features are considered it will be realised that the SUSSEX is one of the most attractive propositions ever offered to the gas undertakings.

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a firm of snuff manufacturers toasted tobacco leaf stems in a rotating drum over a coal and coke fire. The operation was hot, arduous, dirty, and dusty. The cost for fuel was 1s. 6d. per 150 lb. of stem. A gas-operated plant was designed and had given an improved product. The operation was now conducted in cool and clean conditions. The cost for fuel per 150 lb. of stem was now 7½d., and the labour charge had been considerably decreased. In regard to central heating and steam raising, since the Liverpool Gas Company introduced a special rate for under-pressure boilers some very satisfactory orders had been obtained for gas supply for central heating and steam boilers.

Mr. J. FALLON (Incandescent Heat Company) spoke of the use of the radiant tube system of heating in industrial furnaces, which had brought about drastic changes in design. During the last year, 30 of these furnaces were built by his Company, representing an output of some 1,500 tons of bright annealing per day. The capacities of the units were 50 to 100 tons per charge. The fuel consumption represented by those furnaces amounted to over 3 million cu.ft. per day. Another point he would stress was the use of insulating refractories having a weight of less than 30 lb. per cu.ft., being resistant to surface temperatures of 1,200° C. The use of such annealing refractories had made possible further drastic changes in furnace design, and had reduced the thermal capacity, or heat input for attaining working temperatures, to 1/10th of that required by the use of ordinary refractories.

Mr. A. STUBBS (Chairman of the Institute of Fuel, North-Western Section) proposed a vote of thanks to Dr. Walter, and Mr. A. L. HOLTON (Manchester) seconded.

Workshop Practice

by
L. W. LOCKE,
of Perth.

An extract from one of the Papers read before the Scottish Junior Gas Association (Eastern District) at a Short Paper Meeting at Edinburgh on Nov. 6. The other Paper (by Mr. S. G. Melville) was dealt with in our issue for Dec. 1.

At one time cookers were issued at Perth on free loan but when the time came to choose between raising the price of gas or charging a rental on appliances, the latter course was chosen. Thus a certain return was obtained to cover capital expenditure as well as service and maintenance costs. I think it is better that all charges such as fixing, cleaning, and adjustment of appliances should be borne directly by those who incur them and an average charge should be included in the price of the appliance. Various schemes have been devised, some undertakings giving free loan, others simple hire rates, some free loan of meters, others charging a rental, and nearly everyone offering hire-purchase on all higher grade appliances.

Where hire-purchase and sale are contracted, some add only 10% to the cost of the cooker for hire-purchase rates over 3 or 5 years and fitted free; others add 10% to the list price, which may be 30% on cost, for the instalment plan, fitted free, while some fix free, cookers sold at list —*i.e.*, net cost *plus* 30%. Others fix cookers, sold at cost price, free of charge. One could go on enumerating a great variety of charges for appliances. I think that the selling price of appliances should cover the average cost of fixing and a portion of the salaries and administration costs. In some cases we find that it costs us very little to fix an appliance but, on the other hand, we may have a good distance to lay piping and a maximum length allowed must be decided on. In our case it is 30 ft. for all appliances. It is found, however, that 20% added to the net cost of the cookers for sale and a further 10% for hire-purchase, covers all expenditure incurred, allowing a maximum of 30 ft. of piping. In Perth we charge a simple hire rate of 2s. per annum for black cookers, renovated and stoved, but this is too low to cover the costs incurred. For instance, the simple hire rate should be fixed to cover interest on the net cost, depreciation, and maintenance costs which may be as much as 25% per annum on the net cost of the cooker.

Are the days of the black cooker numbered? I think it is inevitable, but here again we have various opinions regarding the best procedure. Some have scrapped their black cookers altogether and are issuing a cheap vitreous enamelled cooker with oven control at higher simple hire rates. But all this means writing off a high capital. Others have taken an easier course in modernizing their existing cookers by vitreous enamelling the cast parts, fixing an oven control, and platerracks. These they put up for hire-purchase or sale at cheaper rates. In Perth, we have taken another course—that is, by renovating the existing cookers, spraying and stoving them to give a pleasing appearance for a simple hire of 2s. per annum.

The castings are placed in readiness for undergoing treatment in the degreasing plant, while the enamels go forward to the caustic soda boiler. The castings are then taken from the degreaser to the brushing plant, and, after brushing, the clean castings, together with the enamels, are taken to the erector where the cooker is rebuilt and packed. They are then taken to the paint spraying plant, where the cooker bodies are mottled, sprayed, and stoved. After stoving the bodies, cornices, and burners, they are taken to the tester, who, on receiving the cock rails and injectors from the brass finisher, fits the hotplate to the cooker and thoroughly tests each one before taking them to the loading bank.

There is also a stream of enamel cookers passing through for cleaning. The cleaning of these cookers is done separately and, except in very bad cases, they are not dismantled apart from the cornices and cock rails. These cookers are cleaned by using a prepared caustic cooker cleaner which is brushed on and left on for an hour before being washed off. Where the cooker linings are in a very bad state the caustic cleaner may be left on overnight before washing off. Fires, radiators, &c., are not put through the degreasing plant. They are dismantled and are treated in the caustic soda boiler before passing to the spraying plant where they receive the desired colour and are stoved. After stoving the radiators go to the tester where valves are fitted and the fires pass to the enamel cooker section where they are rebuilt and thoroughly tested.

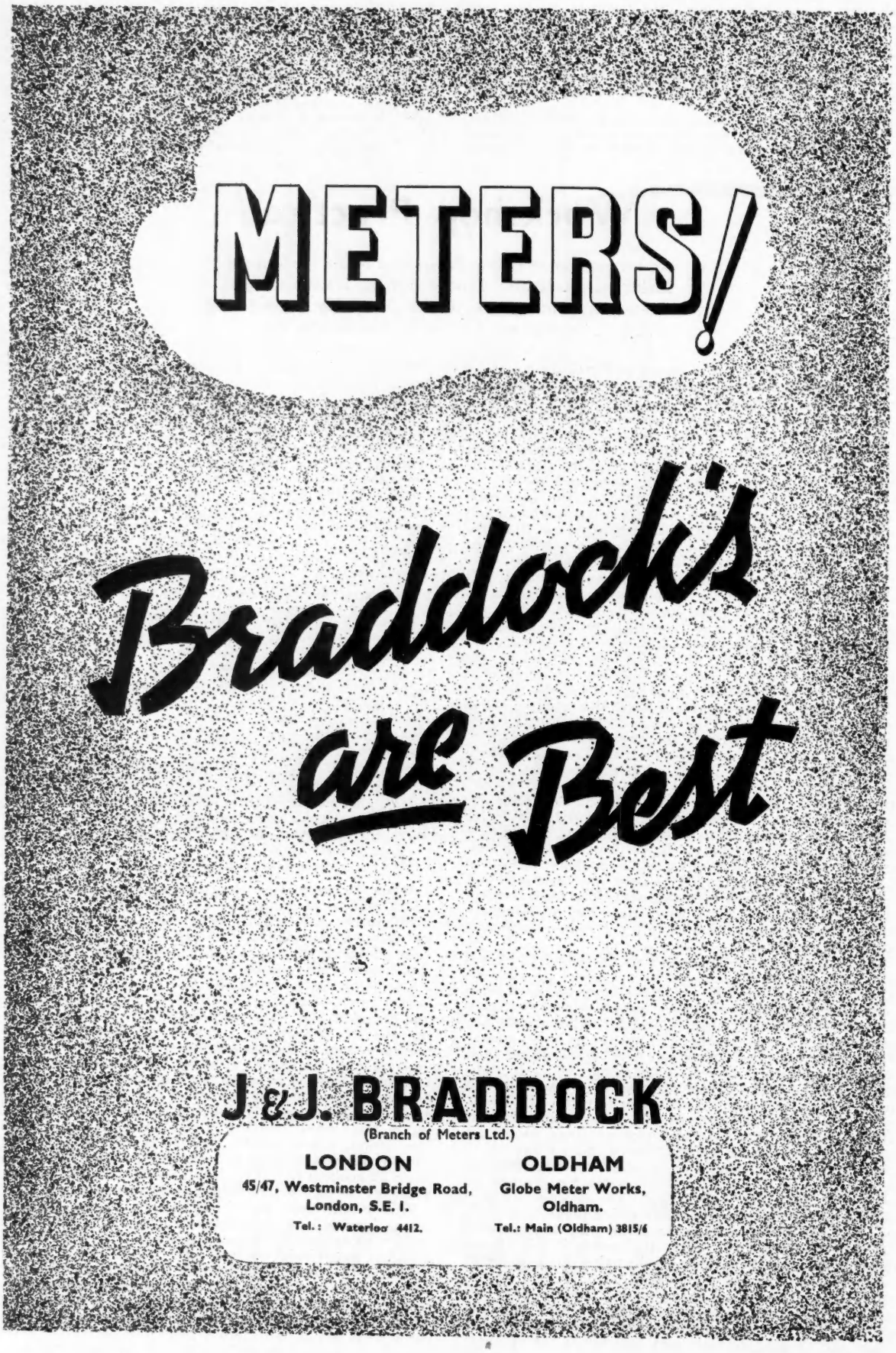
In this plant, trichlorethylene is the solvent. The trichlorethylene is boiled and the parts to be cleaned are only subjected to the action of pure solvent and do not come in contact with grease or dirt which has been removed from previous work. This liquid boils at 87° C., and a thermostat set at a maximum temperature of 120° C. is fitted in the sump. This is an ideal solvent for degreasing purposes and I herewith enumerate a few of its properties:

(1) It dissolves all greases whether animal, vegetable, or mineral.
(2) It has no detrimental action on metal.
(3) It leaves the work dry and in a suitable condition for any succeeding process.
(4) It is non-inflammable.
(5) It can be reclaimed by distillation.

When the warm vapour comes in contact with cold metal which requires cleaning, it condenses on the metal surface, dissolves the grease which is present, and falls back into the base of the plant. The vapour level is kept under control during the operation of the plant by a water-cooled coil fitted near the inside of the degreaser.

Care must be taken in the placing of the parts in the basket to see that they are in an almost vertical position and in particular that the burners are placed with the injector hole downwards to avoid any trap for the condensed vapour. The time contact necessary between the castings and the vapour is about ten minutes, this being the time necessary to raise the parts to the vapour temperature when condensation ceases and with it the solvent action of the vapour. The whole procedure—*i.e.*, the filling of the basket, cleaning of the parts, and emptying of the basket, takes roughly half-an-hour and by placing three cookers per basket it is possible to do anything from 30 to 50 cookers per day. The consumption of the liquor averages out at 1 gallon used for every 15 cookers cleaned.

This is still made use of to clean the enamel linings of the cookers and in some cases the castings are treated in it for a short time to remove paint which has been applied well but not wisely by some consumer who has not approved of the original paint finish. The solution is roughly 10% strength and the length of immersion is about 1½-2 hours for inside enamels, depending on their condition, and ½ hour for outside enamels. In some workshops they use a weak alkali immediately after the degreasing plant, which does away with the brushing of the cooker parts.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This plant comprises of a brush on a flexible shaft used for cleaning the larger castings—*i.e.*, the backs, sides, &c., and a vertical rotating brush for cleaning the cooker smalls. The average length of service of these brushes is 12½ months, and during this time nearly 2,500 large cooker parts are cleaned, and in the case of the vertical brush this amounts to nearly 7,000 parts.

This is certainly not the ideal method of cleaning the castings previous to paint spraying when used openly in a workshop, but we are at present considering the installation of sand-blast equipment which will obviate the dust nuisance.

This plant consists of a paint spray booth and two stoving ovens, one of 156 cu.ft. and the other of 43 cu.ft. capacity. The larger oven is capable of turning out 12 complete cookers per day if required, although this number is in excess of the output of the brushing plant and erecting section. The other oven is used principally for fires, hotplates, &c., as its capacity only allows two No. 2 cookers at a time as against four No. 4 cookers in the larger one.

The principal components of the spray painting plant are: the air compressor, air receiver, and a clarifier which purifies the air before it passes to the pistol. The spray booth is fitted with a turntable and an efficient exhaust fan to remove vitiated air. Eventually the booth becomes encrusted with spray waste but the cleaning can be facilitated by applying lining paper to the walls of the booth over a thick smear of grease.

The procedure we adopt in painting and stoving cookers is as follows: The cooker body *minus* the hotplate is sprayed with one coat of cooker black and stoved between 10 and 15 minutes at 400° F. to set the paint. It is then mottled with aluminium paint and stoved for one hour at the same temperature. Fires when sprayed black get the same stoving time and temperature, but when other colours are applied to appliances stoving temperature is 250° F. and the length of time is ½ hour.

The quality of work from a spray plant is greatly dependent on the operator and the application of the paint. Generally, the distance of the pistol from the work is about 6 to 8 in. and when spraying across large surfaces a better result will be obtained by holding the pistol at right angles to the work and always at the same distance from it. All crevices, &c., should be sprayed before the plain surfaces; this will obviate "misses"—the sign of a careless workman. Each stroke should pass across the work and beyond the edges, or instead release the trigger at the moment of rest before returning. There is no doubt that the spray paint method offers advantages over the older brush method.

Discussion.

The PRESIDENT (Mr. A. C. Rea, Perth) congratulated Mr. Locke on his Paper.

Mr. J. DOW (Kirkcaldy) agreed with Mr. Locke regarding service. The advent of the large industrial consumer had caused a change in gas charges and they should not be asked to bear the same overhead charges as the small consumer. In Kirkcaldy, they made gas as cheap as possible for the industrial consumer. Meter rentals were very handy on occasion and should be charged to the uneconomic consumer. Hire-purchase was an advent of modern times, and at Kirkcaldy they had a six-year plan. Mr. Locke mentioned trichlorethylene as an ideal cleaner; what was the cost of this per cooker?

Mr. R. COWIE (Hawick), with regard to the industrial appliance, thought that the real salesmen of these were the appliance makers themselves and the only part the gas undertakings did was to lay the service. Simple hire should be a thing of the past. What was the cost of reconditioning a black cooker?

Mr. CARSON thought caustic cleaners were apt to take the skin off the enamel of the cooker. Had Mr. Locke experienced any trouble in this respect?

Mr. J. RICHMOND (Penicuik) said it did not pay to renovate cookers in a small works; it was as cheap to buy new ones. He thought that the efficiency of cookers had not increased as much as it might have done. There must be a large staff in the workshop to deal with the cookers from the plant.

Mr. SAWERS disagreed with Mr. Cowie in his point about industrial appliances. If this did happen the company had themselves to blame. He also thought Mr. Richmond was wrong in his statement about cooker efficiencies; in his opinion the modern cooker was far more efficient.

Mr. LOCKE, replying, said that trichlorethylene cost about 3½d. per cooker, a black cooker cost about 10s. to recondition. Simple hire, he thought, was still necessary as many people could not afford to buy. The brand of caustic cleaner they used did not take the skin off the enamel though trouble had been experienced in the past. Their degreasing plant worked only, say, two days per week, putting through about 40 cookers. He thought that the modern cooker was far more efficient than the old.

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PRACTICAL AND THEORETICAL ASPECTS OF

Crude Benzole Recovery

by
F. A. BUTT,
Chief Chemist to the Torquay and Paignton Gas Company.

From a Paper read before a meeting of the Western Junior Gas Association held at Torquay on Nov. 13—the PRESIDENT (Mr. J. E. Ackroyd, of Swindon, G.W.R.) presiding.

It is found that variations in gas flow and in oil flow through the washer have, at any given temperature, a more or less predicable effect upon production provided the general performance of the plant is known. Some details of theoretical considerations, necessarily incomplete, are useful, as these provide an understanding of the variations and of their exploitation in practice.

The mechanism of absorption of benzole vapours by a suitable oil is conveniently explained by the "two-film" theory, which properly exploits the diffusional nature of the process. If coal gas *plus* benzole vapours are in contact with the oil, part of these vapours leave the gas and spread through the oil, in both cases by diffusion. Agitation or relative motion of the gas and oil materially assists this transfer, but the theory also takes account of the relatively stagnant films of oil and gas that remain at the separating interface, and that through these films the benzole can only pass by pure diffusion analogous to heat conductance. It will be seen that the passage of benzole through the series resistances of these films takes time, hence it is necessary to render them thin and as extensive as possible. A great deal of interesting theoretical treatment has been published on this really fascinating subject.*

A good example of a washer, in which the above principles are embodied, is the compact static washer installed at our Hollacombe Works, in which a high practical percentage of absorption is attained quickly. A large area of contact is assured by packed brushwork filling, and recirculation of wash-oil through each compartment independently gives thorough irrigation, reducing interface films thicknesses to a minimum and giving necessary turbulence to the oil.

When a compact washer has been designed embodying these principles yet large enough to prevent undue back pressure of gas it is necessary for the operator to know the effect in practice on crude benzole yield when changes occur in the volumes of gas and wash-oil passing through it. Production of benzole is not proportionate to the amount of gas being passed through the washer, oil flow being constant.

The following figures, chosen from plant records on occasions when other conditions remain fairly constant, demonstrate this:

(*a*) Yield in gallons per 10,000 cu.ft. of gas fell from 1·14 to 1·10, while gas make rose from 80,000 to 85,000 cu.ft. per hour.

(*b*) Similarly, yield fell from 1·39 to 1·25 per 10,000 cu.ft. while gas make rose from 73,000 to 78,000 cu.ft. per hour.

The reason for this may be developed from the fact that if gas containing benzole vapours is brought into contact with wash-oil, absorption takes place until equilibrium is reached, or in practice a constant fraction of this absorption is attained. In these circumstances, the constant K is the ratio of benzole vapour left in the gas to the amount in the wash-oil per unit quantity in each case, and this ratio is independent of the concentration of crude benzole vapours.

Suppose a unit of gas containing two units of benzole is brought into equilibrium with a unit of wash-oil containing no benzole. Since K is made equal to 1, the benzole distributes itself between wash-oil and gas, one unit to each; hence efficiency of extraction equals 50%, and one unit of benzole is recovered per unit of gas passed. Suppose now two unit volumes of gas are passed, four units of benzole are passed into the washer and this divides similarly (K = 1), hence two-thirds of the available benzole is distributed in the gas and one-third in the wash-oil; hence efficiency of extraction now equals 33⅓%.

This is not strictly the case because an increase of gas flow cannot take place independently, but influences other factors; for instance, the increased flow tends to increase internal diffusion of benzole molecules and to reduce interface film thicknesses, thus aiding the speed of diffusion. On the other hand, the reduced time contact operates in a contrary sense. The above reasoning applies to a single effect washer, but the same tendency prevails in a six effect washer, such as our own, wherein a single effect giving efficiency of 50% increases only to about 70% with six effects, and a 33⅓% efficiency with a single effect increases to about 57⅓% with six effects.

A very similar reasoning can be applied in regard to the amount of oil circulated through the washer, and by analogy with the effects of differing gas flow an increased oil circulation does not result in a proportionate yield of benzole.

Masson and McEwen* show that the efficiency of a single compartment washer cannot exceed $\frac{qK}{qK+1}$, where K is used in the sense above and q = quantity of oil passing. This mathematical expression conveys the results of the reasoning already given for gas flow, and is extremely useful for working out the benzole yield at any oil flow if the efficiency of the chamber is known at a given flow.

It is not, however, easy to work out experimentally the efficiency of either a single chamber or a whole washer, as this involves the determination of benzole vapour both before and after absorption. It is simpler to employ an inferential method. Masson and McEwen, in the same Paper, show how the efficiency of any number of chambers up to six (beyond which little further appreciable extraction is attained) may be determined if the efficiency of one chamber is known. If these are determined it is clear that the efficiency of one or any number of chambers bears a certain relationship which may be expressed as a percentage of the efficiency of six chambers. Table I. has been constructed showing the benzole yield of the entire washer as a hundred parts for any given conditions, and then the yield for various numbers of compartments under the same conditions. The method is not perfectly accurate, because it is difficult to keep other conditions entirely constant during the period of test, but for technical purposes it yields trustworthy results.

To test efficiency by this method, choose a dull day (temperatures tend to remain constant), and keep plant conditions constant, until with one and with six compartments respectively steady yields are obtained. Record over a measured hour.

For example, on a certain day it was found that 12 gallons per hour were obtained for six compartments, and 66·7% of this, or 8 gallons per hour, for one compartment. This corresponds according to the Table to an overall efficiency of extraction of crude benzole of 66·5% (or 32%, but this efficiency may be rejected for other considerations), and since 12 gallons per hour = 66·5% of possible extraction, complete crude benzole content = 18 gallons per hour. From this the amount of crude spirit in the gas stream may be calculated and is a fairly uniform figure of 2·1 ± 0·15 gallons per 10,000 cu.ft. of gas, or 3·7 ± 0·5 gallons per ton of coal. Also the amount when carburetted water gas is admixed could be determined in a like manner. Incidentally it is noticeable that there is an increase of benzenoid hydrocarbons in the crude spirit recovered from carburetted water gas.

Preheater.

The three outstanding points about the next piece of plant concerned, the oil preheater, are the steam consumption, the effect of the sludge deposits on the heating tubes, and the easiest and quickest manner of cleaning them. The preheater is a rectangular tank containing U-shaped heating tubes 3 ft. in length, arranged in series, connected externally one above the other in pairs, with a further group at the back intermeshed with them, twenty in all. The essential features dictated by theory as being essential to good heat exchange are the provision of large heat exchange area, high flow of steam together with condensed water in the heating tubes, using tubes with as small a cross-sectional area as practicable, and giving the oil as high a velocity and turbulence as possible over the heating tubes. It is also necessary for a high rate of heat ex-

* Whitman, Ind. Eng. Chem., **16**, 1,215.

* J.S.C.I., XL., **33**T.

TABLE 1.—*Table Showing Ratios of Extraction for One to Six Effects.*

No. of Effects.	Ratio $\frac{n \text{ Effects}}{6 \text{ Effects}} \times 100$.															
1	83·4	78·4	74·6	70·6	64·5	61·6	59·2	57·8	58·8	61·2	65·6	70·7	75·5	80·3	86·2	90	95
2	96·6	94·2	92·6	90·6	83·0	80·8	78·3	77·2	78·1	80·6	85·1	89·9	93·0	95·4	98·0	99·5	100
3	98·0	97·2	97·0	95·3	91·2	89·2	87·5	86·1	87·7	90·3	93·4	96·2	98·2	99·4	99·8	100	100
4	99·8	99·0	98·5	98·1	96·8	95·4	93·4	92·2	93·6	95·2	97·4	99·5	99·6	99·8	100	100	100
5	100	100	100	99·5	99·3	98·7	98·7	98·2	98·4	98·9	99·0	99·7	99·9	100	100	100	100
6	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Efficiency of extraction, % . . .	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95

change that the films adjacent the walls should be thin, as heating can only take place through these by conduction.

It is not a difficult matter to calculate the amount of heat necessary, and hence the minimum steam requirements, to raise the oil flowing through the heater to the required temperature. One point needing attention is the increasing mean specific heat of the wash-oil with increasing temperature. In practice, at an approximate maximum oil flow per hour of 400 gallons the theoretical mean steam requirement is about 330 lb., but actually a little more is needed since all the steam is not condensed and some heat is required to replace that lost by radiation and convection from the outside surface of the lagged preheater. If the average skin temperature is taken, the approximate cooling losses may be obtained by the application of the following formulæ:

Radiation = $17{\cdot}3 \times 10^{-10}\, e(T^4 - t^4)$ B.Th.U./sq.ft./hr.
where e = emessivity factor (black body = 1·0).
T = absolute temperature ° F. of the surface.
t = absolute temperature ° F. of the surrounding surfaces.

Dark asbestos-lagged surface may be taken as, $e = 0{\cdot}7$.

Convection. For the low temperatures we are considering the sides may be taken as losing heat by convection to the same order, $C = 0{\cdot}3$ in the following formula:

Natural convection loss = $C\,(T - t)^{1{\cdot}25}$ in B.Th.U./sq.ft./hr.
where T = Ordinary thermometer reading of the surface.
t = Ordinary thermometer reading of ambient air.

Curves showing these losses, and data on "e" for various surfaces may be found in Spier's "Technical Data on Fuel." These losses may be expressed as lb. of steam required per hour and added.

In time the steam tubes become covered with deposit, and the effect of fouled tubes is naturally to decrease heat transfer, which can be restored for a time by an increase in the steam pressure to the heating tubes, but after a time working temperatures can only be maintained by decreasing the circulation of oil with naturally decreased yields. When this falls so low that working temperatures have to be reduced to about 115° C. the tubes are cleaned.

It seemed desirable to know how the overall heat conductance was affected by this fouling, and, to take one typical case, it was found that 330 gallons an hour of oil, passing at a gauge steam pressure of 60 lb. per sq. in., corresponding to a temperature of 307° F., raised the oil from 80° F. to 255° F. A similar temperature range was given by a circulation of 260 gallons with the same pressure of steam, but working with fouled tubes. It is not possible to find the logarithmic mean temperature difference here, because heat loss and gain in the tubes and the body of the heater is not uniform, for condensation of the steam occurs. Viscosity and thermal conductivity will vary as the temperature of the oil, and also the reduced speed of flow of oil reduces thermal transference. No exact expression for the coefficient of heat transference through the fouled layer can therefore be deduced for the circumstances under review. The above figures must be accepted as the practical reduction in efficiency caused by a deposit of only one-tenth of an inch thick.

The Still.

From the preheater the oil passes over immediately to the still, which is a 20 in. diameter lagged tube fitted with an upper distributor chamber, the base being drilled with holes and some slots. At the base of the still is the overflow chamber, and set in this is the live steam coil and the hot spot, this latter serving to give a brief final heating to the stripped oil to free it of engaged water. The still is filled with washed, evenly graded, medium size coke, about 1¼ in. diameter. It seems that this coke will last in good condition indefinitely, as inspection shows that only the pores of the coke become filled, no other deposits occurring. It is usual, however, from time to time to remove the bottom 1 ft. of coke and replace with fresh at the top. This precautionary measure ensures the restoration of adequate baffling conditions.

Stripping is a "negative absorption" process, obeying in a reverse sense the same laws as govern recovery in the washer, but now with steam as a carrier agent. Observations taken from the working results of the still of the benzole plant are of more importance than attempting to predict results from calculation. In the first place conditions are constantly changing as regards the composition of the benzolized oil, due to differing temperatures of the washer, and of gas make, and alterations imposed by make-up oil additions, and, secondly, it is no easy matter to determine the exact proportions of benzene, toluene, xylenes, and the distillable paraffins, even if conditions were reasonably constant. Nevertheless, the distillation of these or part of these from the wash-oil involves certain physical laws, and theoretical reasoning does provide an idea of what is occurring.

Increased yields of benzole may be obtained by two means, increasing temperatures or increasing steam consumption. Increases beyond a certain point are out of all proportion to the extra amount of benzole recovered; also, hydrocarbons from the wash-oil would continue steadily to increase. Good yields of benzole will be found possible at about 115° C. with lower heavy naphtha yields. It is doubtful if any further benefit would result by attempting to decrease the crude benzole content of the debenzolized oil below 0·5% to 0·25%, and it could be even more if the washer is being only partially worked. In this latter case it is usual to reduce somewhat the steam supply to the still.

The Fractionating Column.

The fractionating column serves to separate the crude benzole of any desired quality, within limits, from the heavy distillate, and obeys the principle of "latent heat exchange." The mixture of vapours enters at the base and the higher boiling fractions condense; and during condensation give up their latent heat of vaporization to the lower boiling point vapours which pass higher up the column, in turn to be condensed, enabling still lower boiling point liquids to continue to pass upwards as vapour. Some of the condensed liquids will be re-vaporized, thereby condensing vapours of higher boiling point liquids, and this condensation, vaporization, re-condensation, and re-vaporization continues indefinitely. It will be seen that a reflux of liquid is necessary to enable fractionation to take place, and that condensation by loss of heat through the column wall should be avoided if critical separation is required, all the available heat being used to strip the reflux in the manner indicated.

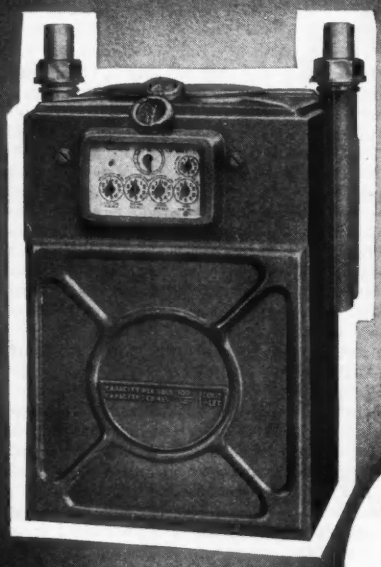
On a crude benzole plant critical separation is not required, and so the column is not lagged, and a shorter one than would otherwise be desirable is used, the reflux being further increased by a water-cooled head or dephlegmator. The water is thermostatically controlled.

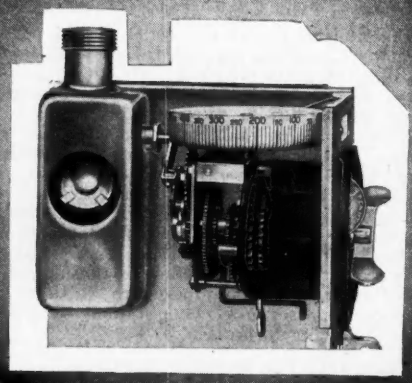
The filling is of utmost importance, and Lessing rings conform admirably to the requirements.

Sludge.

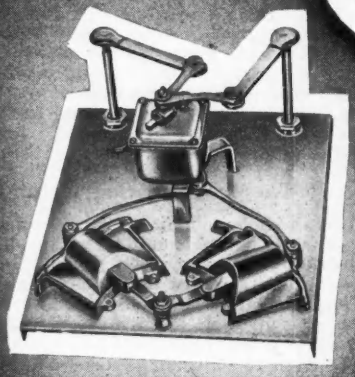
Sludge soluble in hot debenzolized oil or in benzolized oil is without doubt the most troublesome in its effects and frequency, but the easiest to recognize and remedy. A

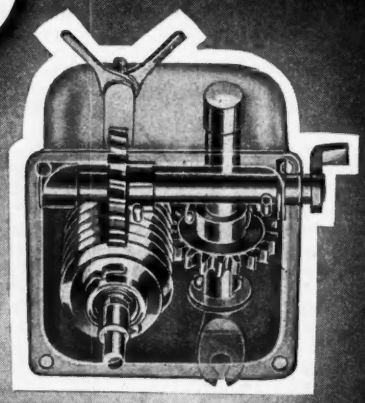
SMITH METERS LTD





THE COMBINATION WHICH HAS WITHSTOOD THE TEST OF TIME





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second type is deposited from hot benzolized oil upon the heating tube of the preheater, and this must be tolerated until restricted circulation, temperature drop, excessive steam consumption in the still, one or all, cause a fall in yield that must be rectified.

The soluble sludge gradually forms in the rack cooler and in the pipe thence to the washer. The flow of oil from the base of the still to the washer via the coolers takes place under a comparatively low head through 2 in. pipes, and when deposition takes place the flow necessarily becomes restricted. There is, however, nothing to prevent the flow from the washer to the still, and in these circumstances oil is bound gradually to fill the still, and for a time the increased head restores the flow through the cooler. After a time, however, the restriction causes such a climb in the still that the oil is entrained and blown over into the fractionating column, where it joins the heavy naphtha. It is instantly recognized by the brown colour and increased flow of liquid as it passes through the heavy naphtha sight box. Tapping the appropriate pipes with a mallet will, early in the course of this trouble, dislodge it, but when tapping finally has no effect, shutting off the water to the coolers for about half an hour will cause its solution and dispersion. It will be appreciated, however, that these are palliatives that must not be carried too far. An accumulation of this type of sludge causes endless repetition of the trouble, and, what is more serious, a less soluble residue of it chokes in time the pipes that supply the individual washer chambers with oil. This seriously impairs the efficiency of the washer, and must be avoided in all circumstances. Means to prevent trouble with this sludge are simple and take about an hour. The cooler is emptied of oil, and a pressure supply of water is attached to the top of it and passed downwards, being discharged through a plugged tee at the base. This removes the black sludge without difficulty, and when the plant is restarted no further trouble is experienced for a long time.

The still is not unaffected by sludge troubles and, as might be expected, it is of a similar nature to that occurring in the preheater, though a little lighter in colour. It makes its appearance round the slots and holes in the bubbler plate at the top of the still, finally narrowing the working limits of entrainment of oil descending over the rim of this plate. This also prevents part of the final vapour enrichment that normally takes place here between the hot oil entering the still and the steam-benzole mixture leaving it. Even the fractionating column is affected. The Lessing rings have never had any sign of material causing blockage, but at the top, strictly in the dephlegmator, the vapour ways or tubes tend to become blocked with a buttery substance. On one occasion this caused back pressure to an extent that the plant persistently unsealed. The remedy consisted in exposing the cooling tubes and cleaning with a brush. The symptom of the trouble was the unsealing at the base of the fractionating column.

Discussion.

Mr. R. C. Taylor (Torquay) spoke in appreciative terms of Mr. Butt's work, and mentioned that the calorific value and also, to some extent, the coke production, was controlled by the operation of the benzole plant. The reduced steaming in the retorts had a definite benefit on the working life. He had an open mind as to whether there was any reduction of gum with benzole washing. He asked Mr. Butt whether a time factor entered into the calculations he had given in the Paper.

Mr. Butt, in reply, said the time factor definitely entered into the process; this was a point which the manufacturers had to take into account when designing the plant.

Mr. W. R. Quiller (Plymouth) said that it was evident that oil flows had to be measured. How was this done at Torquay?

Mr. Butt said that a float type flowmeter was used and gave quite accurate results.

Mr. K. L. Clark (Weston-super-Mare) said there appeared to be minor differences in the plant at Torquay and Weston, although both were by W. C. Holmes & Co. He asked whether the thermostat in the dephlegmator was found to operate satisfactorily. Mention had not been made of the effect of the temperature of the "return oil" on the yield. What was Mr. Butt's opinion of refrigeration in this connection? He said he thought the type of carbonizing plant had more effect on the quality of product than was generally realized. This had been brought home recently at Weston by the starting of intermittent vertical chambers in place of horizontal retorts. There had been a considerable drop in the quality. Regarding sludge, had the Author any figures for the difference in wax formation from American and Roumanian base oils?

Mr. Butt said the thermostat generally was quite all right. He did not think refrigeration plant was an economic proposition at all. Regarding quality they had made 75% benzole, but the quality which was most economic was 65%. He had no information as to different oils, but thought the oil used at Torquay was of Roumanian origin.

The discussion closed with a hearty vote of thanks to Mr. Butt.

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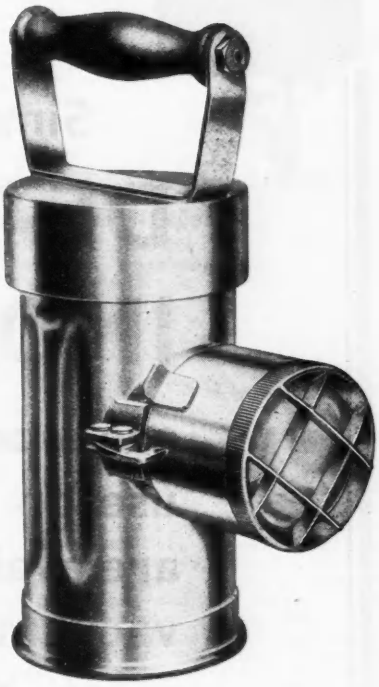

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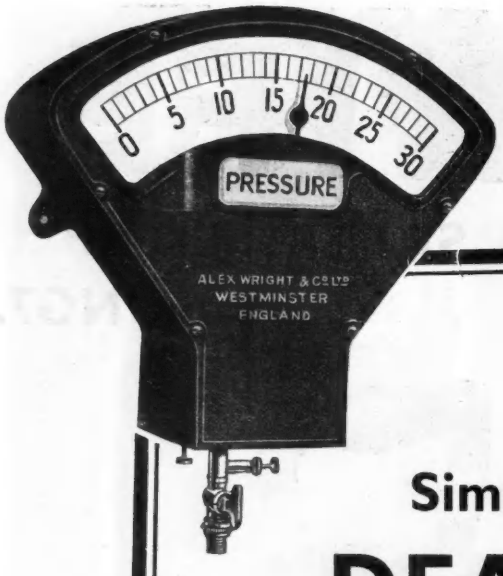

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Gas Markets and Manufactures

Stock Market Report

(For Stock and Share Lists, see later pages)

The final Account of the year closed on Friday last with a slightly firmer tendency. The volume of business throughout its run has been comparatively small, and until the holidays are over it is not anticipated that any marked increase will be displayed. British Funds again topped the list for popularity, being steadily bought both on home and foreign account, and quotations closed fractionally higher. A little more activity was noticeable in home rails, while foreign bonds made good headway. Industrials on the whole were weak, only a few specialities showing any improvement, while speculative buying was confined for the most part to Kaffirs. Tea and rubber shares were quiet but steady.

Business in Gas stocks and shares followed the same trend, being comparatively small in volume though prices remained steady with tendency to harden. In contrast with the previous week several quotations were marked up. Gas Light 3½% debenture and British 7% preference both registered gains of 3 points, while at the local Exchange Newcastle units closed 3d. higher at 23s. 6d. On the other hand, Commercial and Uxbridge ordinaries both reacted 2 points, though no business was recorded in either case at the lower levels. A parcel of the former is on offer at 84 giving a yield of £5 19s.%, an exceptionally high one for this class of stock.

In a few weeks from now the first results and dividends for the current year will be coming through and annual meetings will be the order of the day. There is little doubt that in the majority of cases dividends will be at least maintained. As to the future, much depends upon the cost of our raw material, though much of the extra expenditure under this head will be met by economies in other directions, but it is possible that some small increases in gas prices will be inevitable.

Current Sales of Gas Products

The London Market for Tar Products.

Dec. 13.

The London Tar Products market is very quiet, and there are few changes to report in prices.

Pitch is 38s. per ton f.o.b.

Creosote, 5⅞d. to 6d.

Refined tar, 3¾d.

Pure toluole, about 2s. 4d.; pure benzole, 1s. 9d.; 95/160 solvent naphtha, 1s. 7d. to 1s. 8d.; 90/160 pyridine, 11s. to 12s. —all per gallon naked at makers' works.

Tar Products in the Provinces.

Dec. 13.

The average prices of gas-works products during the week were: Gas-works tar, 25s. to 30s. Pitch—East Coast, 38s. to 40s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 38s. to 40s.* Toluole, naked, North, 1s. 8d. to 1s. 9d. Coal tar, crude naphtha, in bulk, North, 8d. to 8¼d. Solvent naphtha, naked, North, 1s. 5½d. to 1s. 6d. Heavy naphtha, North, 1s. 3d. to 1s. 3½d. Creosote, *ex* works, in bulk, North, liquid and salty, 5d. to 5½d.; low gravity, 4⅝d. to 4¾d. Heavy oils, in bulk, North, 5d. to 5¼d. Carbolic acid 60's, 3s. 9d. to 4s. Naphthalene, £14 to £17. Salts, 80s. to 85s., bags included. Anthracene, "A" quality, 4½d. to 4⅝d. per minimum 40% purely nominal; "B" quality unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *Dec.* 11.

When the market will take a turn for the better is not known, but meantime, with a few exceptions, distillers are maintaining prices.

Crude gas-works tar.—Actual value is 37s. to 38s. per ton *ex* works in bulk.

Pitch is available at 30s. to 32s. 6d. per ton f.o.b. Glasgow for export, and 30s. per ton *ex* works in bulk for home trade.

Refined tar is quiet with controlled prices unchanged at 3d. to 3¼d. per gallon free on rails for export, and 3½d. to 3¾d. per gallon *ex* works in buyers' packages for home trade.

Creosote oil is in fair request as follows: Specification oil, 5½d. to 5⅝d. per gallon; low gravity, 6¼d. to 6½d. per gallon; neutral oil, 5¼d. to 5½d. per gallon; all *ex* works in bulk.

Cresylic acid.—New business is still difficult and values show a reduction as follows: Pale, 97/99%, 3s. 3d. to 3s. 6d. per gallon; dark, 97/99%, 3s. to 3s. 3d. per gallon; and pale, 99/100%, 3s. 9d. to 4s. 3d. per gallon; all *ex* works in buyers' packages.

Crude naphtha is still valued at 6d. to 6½d. per gallon *ex* works in bulk, according to quality and district.

Solvent naphtha.—90/160 grade is 1s. 5d. to 1s. 6d. per gallon, and 90/190 heavy naphtha, 1s. to 1s. 1d. per gallon.

Motor benzole is changing hands at 1s. 4d. to 1s. 4½d. per gallon.

Pyridine.—Prices remain nominal at 11s. to 12s. per gallon for 90/160 grade, and 12s. to 13s. per gallon for 90/140 grade.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s. d.		s. d.	
Crude benzole . . .	0 9½	to	0 10	per gallon at works
Motor ,, . . .	1 3	,,	1 3½	,, ,, ,,
90% ,, . . .	1 4	,,	1 4½	,, ,, ,,
Pure ,, . . .	1 8	,,	1 8½	,, ,, ,,

Trade Notes

"Veritas Spherelite Junior."

Messrs. Falk, Stadelmann, & Co., Ltd., have recently introduced the "Veritas Spherelite Junior," which is an entirely new line. The chief feature of this fitting is that the globe gallery is screwless, thus obviating any risk of damage to the glassware by reason of expansion or contraction. The gallery itself is one-piece and finished white enamel. The pendant can be supplied either chromium-plated, steel, or red bronze. The "Spherelite Junior" is 1-light Universal fitting and the glassware is a 6 in. sphere. The illumination is very effective, glareless, and evenly diffused.

"Some Bartlett Products."

This is the title of an illustrated list compiled by Messrs. G. F. E. Bartlett, Kitchen Engineers and Sheet Metal Workers, Bell Street, London, N.W. 1, to show some of their recent productions. As manufacturers to the trade, they are called upon to construct all kinds of sheet metal goods in all kinds of metals, and their wide experience is at the disposal of their clients in designing special apparatus, suggesting improvements in existing designs, and overcoming technical difficulties of manufacture. The Bartlett organization claims to be able to deal with single articles or large quantities with the same efficiency, and every endeavour is made to give that service which will enable their trade customers to have the equivalent of their own works always ready to meet any call that may normally be made upon them.

Lessing Contact Rings.

An interesting brochure has recently been published by the Hydronyl Syndicate, Ltd., of 50, Queen Anne's Gate, S.W. 1, entitled "Lessing Contact Rings." Complete with photographic examples of plant employing these rings, the brochure discusses fully the uses and advantages of this patented method of bringing gases into intimate contact with liquids, as, for instance, in ammonia scrubbers, flue gas washers, oxygen rectifiers, benzole stills and scrubbers, and carbolic stills. There is a wide field for their application in the Gas Industry, where they have the advantage of exposing a greater surface and occupying a smaller volume of dead space for a given size of element than other types. They have been widely used for many years for a large variety of purposes and are recognized by the highest authorities on fractional distillation, gas scrubbing, and similar operations, as a most efficient tower packing material.

Lessing Contact Rings consist of uniformly shaped cylinders of approximately equal length and diameter, having a central partition along the axis of the cylinder which adds about one-third to the superficial area and acts as an additional baffle. They are packed indiscriminately into towers or other vessels resting on suitable grids. The grids may have apertures practically as wide as the outer diameter of the rings themselves, as these tend to bridge over them and thus do not fall through. The total free space of the grids should be as large as convenient and should not form undue constrictions.

Owing to the irregular arrangement of the rings and their special construction, a liquid descending and gases or vapours ascending a tower are continually deflected in their path, whereby a high degree of turbulence and intermingling is obtained and channelling is entirely avoided. At the same time the peculiar design of Lessing Rings gives them a high drainage capacity, and this together with the small volume occupied by the solid material, reduces the resistance exerted by the packing to exceedingly small values.

The present brochure provides much valuable information on their use.

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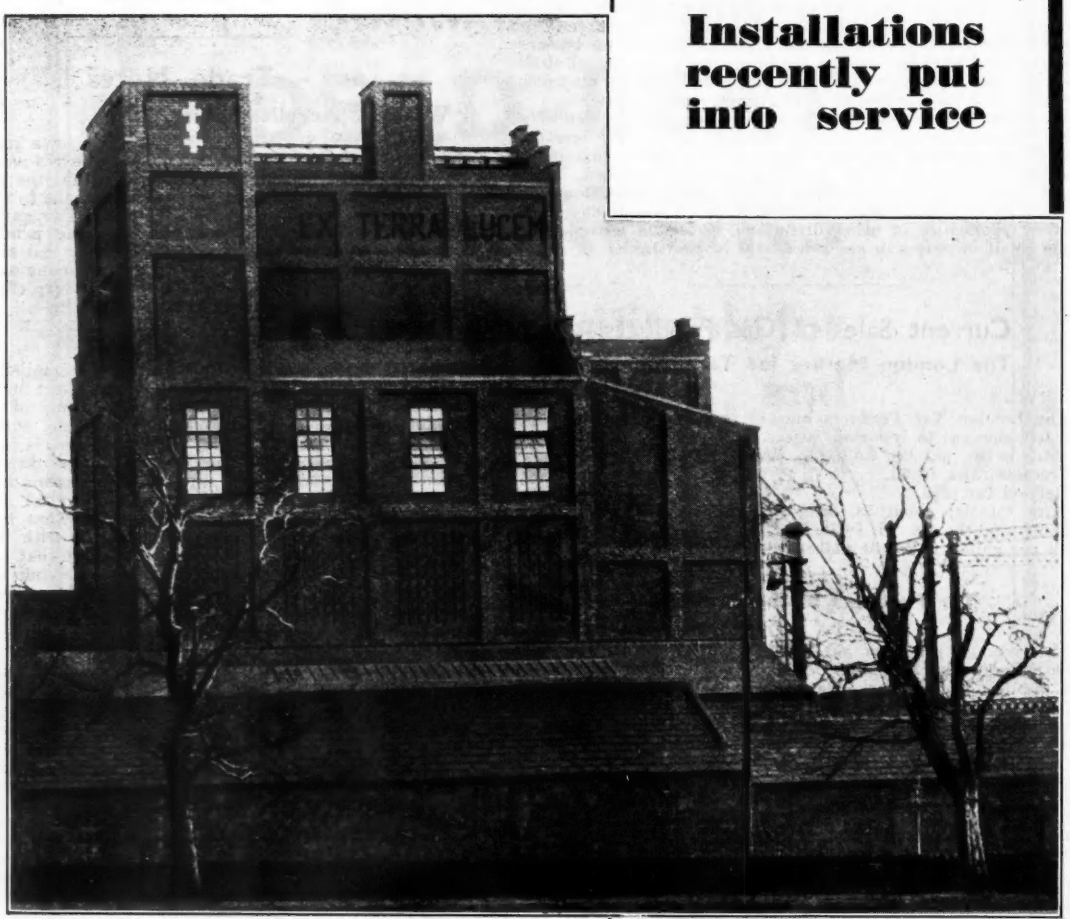

Carbonizing plants ordered or started up during 1937 bring the total installations of West design up to 416. The total of retorts or chambers involved is 10,732.

YEADON Continuous carbonization in Glover-West vertical retorts was adopted by the Yeadon and Guiseley Gas Company for their works modernization scheme of 1934. Smokeless operation was an important factor in the decision. The extension to this plant which began operation early in the present year has increased its production capacity by 50 per cent.

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STOCK AND SHARE LIST

Official Quotations on the London Stock Exchange

Issue. £	Stock or Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Dec. 10.	Rise or Fall on Week.	Transaction Lowest and Highest Prices During the Week.
1,767,439	Stk.	Sept. 6	8	8	Alliance & Dublin Ord. ...	161—166	...	...
374,000	,,	June 21	4	4	Do. 4 p.c. Deb. ...	95—100	...	...
558,890	,,	Aug. 9	7	7	Barnet Ord. 7 p.c.	158—163	...	...
300,000	1	Oct. 4	1/9⅜	1/4⅜	Bombay, Ltd.	26/—28/-	...	...
179,915	Stk.	Aug. 9	9⅜	9⅜	Bournemouth sliding scale ...	200—205	...	...
590,407	,,	,,	7	-	Do. 7 p.c. max. ...	158—163	...	160
493,960	,,	,,	6	6	Do. 6 p.c. Pref. ...	133—138	...	135½
50,000	,,	June 21	3	3	Do. 3 p.c. Deb. ...	79—84	...	...
262,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	98—103	...	...
335,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	115—122	...	...
357,900	,,	Aug. 9	7½	7½	Brighton, &c., 6 p.c. Con. ...	150—155	...	...
649,955	,,	,,	6½	6½	Do. 5 p.c. Con. ...	133—138	...	133½—134½
205,500	,,	,,	6	6	Do. 6 p.c. 'B' Pref.	127—133	...	...
855,000	,,	Sept. 20	8	7	British Ord.	145—150	...	145
100,000	,,	June 21	7	7	Do. 7 p.c. Pref.	143—148	+3	145½
350,000	,,	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	110—115	...	...
120,000	,,	June 7	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...	96—98
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	102—107	...	...
450,000	,,	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...	95
100,000	10	22 May '33	6	4	Cape Town, Ltd.	1½—2½	...	...
100,000	10	6 Nov.'33	4½	4½	Do. 4½ p.c. Pref. ...	1½—3½	...	...
150,000	Stk.	June 21	4½	4½	Do. 4½ p.c. Deb. ...	79—84	...	...
626,860	,,	July 19	6	6	Cardiff Con. Ord.	125—130	...	127—127⅝
237,860	,,	June 7	5	5	Do. 5 p.c. Red. Deb.	107—112	...	...
98,936	1	Oct. 4	2/-	2/-	Colombo Ord.	1⅝—1⅞	...	...
24,510	1	,,	1/4⅜	1/4⅜	Do. 7 p.c. Pref. ...	23/6—25/6	...	...
739,453	1	Oct. 4.	-/11·48	-/11·48	Colonial Gas Assn. Ltd. Ord.	17/—19/-	...	...
296,144	1	,,	1/3·30	1/3·30	Do. 8 p.c. Pref.	22/—24/-	...	...
1,775,005	Stk.	Aug. 9	5	5	Commercial Ord.	80—85	−2	...
620,000	,,	Nov. 29	3	3	Do. 3 p.c. Deb. ...	73—78*	...	...
286,344	,,	Aug. 23	5	5	Do. 5 p.c. Deb. ...	113—118	...	...
807,560	,,	Aug. 9	7	7	Croydon sliding scale ...	140—145	...	...
644,590	,,	,,	5	5	Do. max. div.	110—113	+1	110½—111½
620,385	,,	June 21	5	5	Do. 5 p.c. Deb.... ...	113—118	...	117—117½
239,000	,,	Aug. 9	5	5	East Hull Ord. 5 p.c.... ...	98—103	...	...
185,355	,,	Aug. 9	6	6	East Surrey Ord. 5 p.c. ...	120—125	...	...
176,211	,,	June 7	5	5	Do. 5 p.c. Deb. ...	113—118	...	...
250,000	1	Nov. 15	7	4	Gas Consolidation Ord. ...	19/6—21/6	...	...
250,000	1	,,	4	4	Do. 4 p.c. Red Cum. Pref.	18/6—20/6	...	...
19,255,284	Stk.	Aug. 9	5⅔	5⅔	Gas Light & Coke 4 p.c. Ord.	25/—26/-a	...	25/—25/6
2,600,000	,,	,,	3⅓	3⅓	Do. 3½ p.c. max.	83—86	...	84½—86
4,477,106	,,	,,	4	4	Do. 4 p.c. Con. Pref....	100—103	...	101—102½
2,993,000	,,	July 5	...	3⅓	Do 3½ p.c. Red. Pref.	101—103	...	101½—102½
8,602,497	,,	Nov. 29	3	3	Do. 3 p.c. Con. Deb. ...	78—81*	+½	79½—80½
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	112—115*	+2	112½—114
3,500,000	,,	,,	4½	4½	Do. 4½ p.c. Red. Deb....	110—113*	...	110½—112½
700,000	,,	Sept. 6	3¼	3¼	Do. 3¼ p.c. Red. Deb....	98—101	+3	98½—100
270,466	,,	Aug. 23	6	6	Harrogate New Cons. ...	115—120	...	...
213,200	,,	Aug. 9	6	6	Hornsey Con. 3½ p.c. ...	118—123	...	...
5,600,000	,,	Nov. 1	12	8	Imperial Continental Cap. ...	137—142	...	137½—141
223,130	,,	July 19	3½	3½	Do. 3½ p.c. Red. Deb. ...	89—94	...	...
285,242	,,	Aug. 9	8½	8½	Lea Bridge 5 p.c. Ord. ...	170—175	...	...
75,000	,,	Nov. 29	†10	†10	Malta & Mediterranean ...	145—155*	...	...
392,000	—	Oct. 1	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	100—103	...	...
231,978	Stk.	Aug. 23	5	5	M.S. Utility 'C' Cons. ...	101—106	...	...
968,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	96—101	...	...
360,075	,,	June 21	4	4	Do. 4 p.c. Deb. ...	97—102	...	...
148,955	,,	,,	5	5	Do. 5 p.c. Deb. ...	115—120	...	...
75,000	,,	Nov. 15	†9	†6	Montevideo, Ltd.	85—90	...	86½—87
250,000	,,	Aug. 9	7½	7½	North Middlesex 6 p.c. Con.	147—152	...	...
396,160	,,	Aug. 9	5	5	Northampton 5 p.c. max. ...	110—115	...	110
300,000	,,	Oct. 18	17	†9	Oriental, Ltd....	153—158	...	156
468,537	,,	June 7	8	8	Plymouth & Stonehouse 5 p.c.	157—162	...	...
621,667	,,	Aug. 9	8¼	8¼	Portsmouth & Gosport Cons.	164—169	...	...
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	104—109	...	...
73,350	,,	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...	...
441,275	1	Sept. 20	1/1½	1/1½	Severn Val. Gas Cor. Ld. Ord.	21/6—23/6	...	22/3
460,810	1	,,	-/10⅛	-/10⅛	Do. ,, 4½ p.c. Cum. Pref.	19/6—21/6	...	20/6—20/8½
133,201	Stk.	Aug. 23	5	8½	Shrewsbury 5 p.c. Ord. ...	130—135	...	...
1,371,752	1	Sept. 6	1/2⅝	1/2⅝	South East'n Gas. Cn.Ld. Ord.	23/—25/-	...	23/6—24/-
871,636	1	,,	-/10½	-/10½	Do. 4½ p.c. Red. Cum. Pref.	20/—22/-	...	20/1½—20/9
498,818	1	,,	4	4	Do. 4 p.c. Cum. Pref. ...	18/—20/	...	...
450,000	Stk.	Aug. 9	4	4	Do. 4 p.c. Deb.	99—102	...	...
150,000	,,	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	96—99	...	...
6,709,895	,,	Aug.	6	5	South Met. Ord.	101—103½	...	101½—103
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf. ...	131—136	...	...
850,000	,,	,,	4	4	Do. 4 p.c. Irred. Pf. ...	98—101	...	...
1,895,445	,,	June 21	3	3	Do. 3 p.c. Deb. ...	75—80	...	76½—79
1,000,000	,,	July 5	5	5	Do. 5 p.c. Red. Deb....	110—113	...	...
1,543,795	,,	Aug. 9	6	6	South Suburban Ord. 5 p.c....	120—125	...	120½—122½
512,825	,,	,,	5	5	Do. 5 p.c. Pref....	110—115	...	...
500,000	,,	,,	4	4	Do. 4 p.c. Pref....	95—100	...	...
250,000	,,	,,	...	§18/9	Do. 3¾ p.c. Red. Pref.	98—101	...	99¾
888,587	,,	June 7	5	5	Do. 5 p.c. Deb....	115—120	...	117½
250,000	,,	,,	4	4	Do. 4 p.c. Deb....	98—101	...	...
200,000	,,	Sept. 20	...	3½	Do. 3½ p.c. Red. Deb.	94—99	...	...
427,859	1	Nov. 1	1/2⅜	9⅜	S. Western Gas & Water Ord.	18/6—20/6	...	...
160,523	1	,,	-/10⅜	-/10⅜	Do. 4½ p.c. Red. Cum. Pf.	19/6—21/6	...	...
110,000	Stk.	June 21	4	4	Do. 4 p.c. Red. Deb. ...	97—102	...	...
750,541	,,	Aug. 9	5½	5	Southampton Ord. 5 p.c. ...	111—116	...	...
148,836	,,	June 7	4	4	Do. 4 p.c. Deb.	97—102	...	...
350,000	,,	Aug. 23	5½	5½	Swansea 5½ p.c. Red. Pref. ...	110—115	...	...
94,000	,,	June 7	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...	...
1,076,490	,,	Aug. 9	6⅔	6⅔	Tottenham and District Ord.	132—137	...	...
409,835	,,	,,	5½	5½	Do. 5½ p.c. Pref....	121—126	...	...
62,235	,,	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...	...
371,850	,,	June 7	4	4	Do. 4 p.c. Deb. ...	97—102	...	...
888,629	1	Oct. 4	6	4	U. Kingdom Gas Cor. Ord.	20/—22/-	...	20/7½
937,743	1	Nov. 15	4½	4½	Do. 4½ p.c. 1st Cum. Pref.	20/—22/-	...	20/6
745,263	1	June 7	4½	4½	Do. 4½ p.c.2nd Non-Cum.Pf	17/—19/-	...	...
1,000,000	Stk.	Sept. 20	3½	3½	Do. 3½ p.c. Red. Deb. ...	96—99	...	97½
373,939	,,	Aug. 9	7	7	Uxbridge, &c., 5 p.c. ...	138—143	−2	...
133,010	,,	,,	5	5	Do. 5 p.c. Pref. ...	109—114	...	...
1,371,138	,,	Aug. 9	7	7	Wandsworth Consolidated ...	140—145	...	141—143
2,525,768	,,	,,	4	4	Do. 4 p.c. Pref. ...	99—102	...	100½
1,343,964	,,	June 7	5	5	Do. 5 p.c. Deb. ...	115—120	...	...
383,745	,,	,,	4	4	Do. 4 p.c. Deb. ...	97—102	...	...
558,342	,,	Aug. 9	7	7	Watford and St. Albans Ord.	140—145	...	...
200,000	,,	,,	5	5	Do. 5 p.c. Pref. ...	109—114	...	...
200,000	,,	,,	5½	5½	Do. 5½ p.c. Pref. ...	121—126	...	...
200,000	,,	Nov. 29	4	4	Do. 4 p.c. Red. Deb.	95—100*	...	...
100,000	,,	,,	3½	3½	Do. 3½ p.c. Red.Deb.	94—99*	...	...

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BRISTOL EXCHANGE.								
347,756	Stk.	July 19	6	5	Bath Cons.	120—122	...	...
1,667,250	,,	July 19	5	5	Bristol, 5 p.c. max.	116—117	...	...
120,420	,,	June 7	4	4	Do. 1st 4 p.c. Deb. ...	100½—102½	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	100½—102½	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	120—123	...	...
274,000	,,	July 19	5	5	Newport (Mon.) 5 p.c.max. ...	100—105	...	...
13,200	12	Sept. 6	8	7	Pontyp'l Gas & W. 10 p.c. 'A'	13—14	...	...
13,600	10	,,	6	5	Do. 7 p.c. 'B'	11⅞—12½	...	...
40,000	10	,,	6	5	Do. 7 p.c. 'C'	11⅞—12⅝	...	...
140,778	Stk.	Aug. 9	5	5	Weston-super-Mare Cons. ...	110—112	...	...
64,338	,,	June 21	4	4	Do. 4 p.c. Deb.	96—98	...	...
33,340	,,	,,	7½	7½	Do. 7½ p.c. Deb.	157—160	...	...
LIVERPOOL EXCHANGE.								
157,150	Stk.	Aug. 9	6½	5	Chester 5 p.c. Ord.	104—109	...	...
92,500	,,	June 21	4	4	Do. 4 p.c. Pref.	97—101	...	...
36,430	,,	,,	3½	3½	Do. 3½ p.c. Deb.... ...	89—92	...	...
41,890	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	98—102	...	...
2,167,410	,,	Aug. 23	6	6	Liverpool 5 p.c. Ord. ...	125½—127½	...	...
245,500	,,	June 21	5	5	Do. 5 p.c. Red. Pref. ...	99—104	...	...
306,083	,,	July 1	4	4	Do. 4 p.c. Deb. ...	102—104	...	...
106,280	,,	Aug. 9	10	10	Preston 'A' 10 p.c.	206—216	...	...
188,219	,,	,,	7	7	Do. 'B' 7 p.c.	147—157	...	...
NEWCASTLE EXCHANGE.								
122,577	Stk.	Aug. 9	8	8	Blyth 5 p.c. Ord.	165—166	...	...
732,000	,,	Aug. 9	5	5	Hartlepool G. & W. Cn. & New	112—114	...	...
2,061,315	,,	Aug. 9	5⅝	5	Newcastle & Gateshead Con.	23/3—23/9*a*	+-/3	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	98—100	...	...
776,706	,,	June 21	3½	3½	Do. 3½ p.c. Deb. ...	90½—91½	...	...
277,285	,,	Nov. 1	5	5	Do. 5 p.c. Deb. '43...	103—105	...	...
332,351	,,	Aug. 23	6	6	Sunderland 6 p.c. max. ...	139—141	...	...
NOTTINGHAM EXCHANGE.								
542,270	Stk.	Aug. 9	9	6	Derby Con.	135—145	...	...
55,000	,,	June 7	4	4	Do. 4 p.c. Deb.	100—105	...	...
20,000	10	June 7	5	5	Long Eaton 5 p.c. Pref. ...	10—12	...	...
80,000	Stk.	,,	5	5	Do. 5 p.c. Deb. ...	105—110	...	...
SHEFFIELD EXCHANGE.								
10,000	Stk.	Sept. 20	10	10	Great Grimsby 'A' Ord. ...	210—220	...	...
6,500	,,	,,	10	10	Do. 'B' Ord. ...	210—220	...	...
79,000	,,	,,	10	10	Do. 'C' Ord. ...	205—210	...	...
1,806,339	,,	Aug. 23	6	6½	Sheffield Cons.	144—148	...	...
95,000	,,	July 5	4	4	Do. 4 p.c. Deb.... ...	100—103	...	...
Supplementary List of Stocks and Shares not Officially Quoted								
202,152	Stk.	Sept. 6	25/-*b*	5	Ascot Ord.	100—105	...	...
128,182	,,	July 5	5	5	Do. 5 p.c. Pref.	108—113	...	...
573,156	1	Nov. 15	5	5	Assd. Gas and Water Ord. ...	19/—21/-	...	19/3—19/10½
167,506	1	,,	...	-/4*c*	Do. 4 p.c. Red. Cum. Pref.	19/—20/-	...	20/-
253,118	1	,,	...	4	Do. 4 p.c. Irred Pref. ...	18/—20.-	...	19/9—21/-
500,000	1	,,	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	19/—21/-	...	...
500,000	Stk.	Sept. 6	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...	...
31,035	1	Aug. 23	...	-/4⅜	Associated Utilities 4 p.c. Pref.	16/6—18/6	...	...
100,000	Stk.	...	...	...	Do. 3½ p.c. Red. Deb.	95—100	...	...
17,000	,,	Aug. 23	8	8	Bognor Orig. Ord. 'A' ...	160—170	...	...
62,210	,,	,,	8	8	Do. New Addl. 'A' ...	160—170	...	...
87,160	,,	,,	7	7	Do. New 7 p.c. max. ...	141—146	...	...
37,440	,,	Aug. 9	10	10	Cam. Univ. & Town 10 p.c.max.	193—203	...	...
125,970	,,	,,	7	7	Do. 7 p.c. max.	135—140	...	...
39,025	,,	,,	5	5	Do. 5 p.c. max.	98—103	...	...
65,000	,,	Aug. 9	8½	7½	Eastbourne 'A' 5 p.c. ...	158—163	...	160
198,000	,,	,,	7	6	Do. 'B' 3½ p.c.	128—133	...	...
112,312	,,	,,	5	5	Do. 5 p.c. Pref.	108—113	...	...
130,000	,,	June 21	5	5	Do. 5 p.c. Deb.	115—120	...	...
24,000	30	Aug. 23	8½	8½	Great Yarmouth 8½ p.c. max.	44—49	...	...
59,400	30	,,	7½	7½	Do. 7½ p.c. max.	34—39	...	...
51,160	Stk.	June 7	5½	5½	Do. 5½ p.c. Deb.... ...	120—125	...	...
152,600	,,	Sept. 6	9	8	Guildford Cons.	170—175	...	...
54,055	,,	,,	5	5	Do. 5 p.c. Pref.	110—115	...	...
68,250	,,	June 7	5	5	Do. 5 p.c. Deb.	113—118	...	...
156,600	,,	Aug. 23	7½	7½	Hampton Court Cons. ...	158—163	...	...
73,620	,,	Sept. 6	8½	8½	Luton Cons. 'A'	163—168	...	...
107,960	10	Sept. 20	5½	4	Mid Kent Ord.	8¾—9¾	...	...
230,940	Stk.	Aug. 9	10	10	Oxford & District Ord. ...	205—210	...	...
47,112	,,	,,	5	5	Do. 5 p.c. Pref.	108—113	...	...
50,000	,,	,,	6	6	Do. 6 p.c. Red. Pref. ...	110—115	...	...
126,193	,,	Nov. 15	7½	7½	Peterborough Ord.	158—163	...	...
64,990	,,	Sept. 6	7½	6½	Redditch Ord.	125—135	...	...
166,850	,,	Aug. 9	8	8	Romford Ord.	155—160	-2½	...
60,000	,,	,,	4	4	Do. 4 p.c. Pref.	97—100	...	...
44,000	,,	Sept. 20	5	5	Do. 5 p.c. Deb.	113—118	...	...
25,570	,,	Aug. 9	5½	5½	Rugby 5½ p.c. Pref.	125—130	...	...
25,000	,,	,,	6	6	Do. 6 p.c. Red. Pref. ...	106—111	...	...
42,750	,,	June 7	5½	5½	Do. 5½ p.c. Deb.	122—127	...	...
10,950	,,	Aug. 23	8	8	Ryde Ord.	158—163	...	...
270,086	,,	Sept. 6	7	7	Slough Ord.	135—140	...	...
21,000	,,	June 21	5	5	Do. 5 p.c. Deb.... ...	110—115	-2	110
28,872	1	Nov. 1	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	19/—21/-	...	...
28,866	1	Sept. 6	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	18/6—20/6	...	...
137,730	Stk.	Aug. 9	7	7	Southgate & Dist. 7 p.c. max.	140—145	...	...
62,500	,,	,,	5	5	Do. 5 p.c. Pref.	110—115	...	...
117,228	,,	Aug. 23	5	5	Swindon Cons.	106—111	...	...
60,425	,,	June 7	5	5	Do. 5 p.c. Deb.	110—115	...	...
64,380	,,	June 7	5	5	Torquay and Paignton 5 p.c. Pf	110—115	...	...
500,000	1	Nov. 15	...	-1·15*c*	United Kingdom Gas Corpn. 4 p.c. 1st Red. Cum. Pref.	19/—21/-	...	20/-
33,858	1	,,	...	-/2·70*c*	Do. 4½ p.c. 1st. Cum Pref.	20/—22/-	...	20/6
130,000	Stk.	Aug. 9	5	5	Wakefield Ord.	120—125	...	...
81,650	,,	,,	5	5	Do. 5 p.c. max.	103—108	...	...
82,000	,,	Aug. 6	6	6	Weymouth Ord.	103—108	...	...
98,384	,,	Aug. 9	6	6	Wolverhampton 6 p.c. Pref....	120—125	...	...
160,000	,,	June 21	5½	5½	Do. 5½ p.c. Rd. Db	108—113	...	...
90,000	,,	June 21	5	5	York 5 p.c. Red. Deb. ...	105—110	...	107
133,640	,,	July 19	6½	6½	Yorktown (Cam.) 5 p.c Cons.	128—133	...	...
120,000	,,	,,	5	5	Do. 5 p.c. Pref.	108—113	...	...
35,000	,,	June 7	5½	5½	Do. 5½ p.c. Deb.... ...	123—128	...	...

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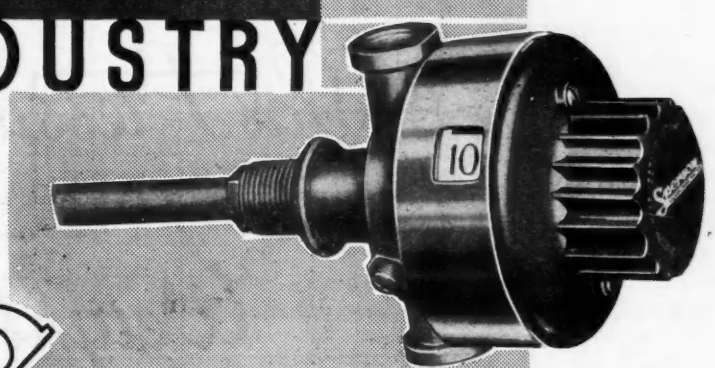

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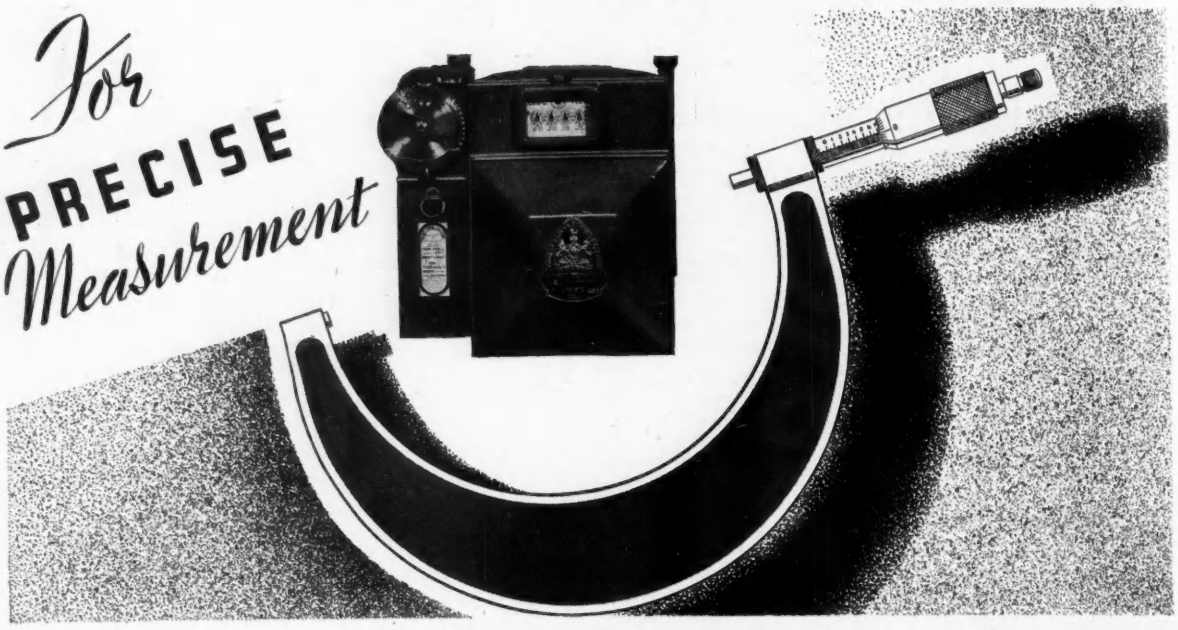

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